

CHINA.

IMPERIAL MARITIME CUSTOMS.

II.—SPECIAL SERIES: No. 2.

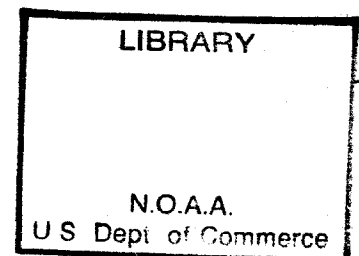
**MEDICAL REPORTS,**

FOR THE HALF-YEAR ENDED 30<sup>TH</sup> SEPTEMBER 1879.

**18th Issue.**

PUBLISHED BY ORDER OF  
**The Inspector General of Customs.**

SHANGHAI:  
STATISTICAL DEPARTMENT  
OF THE  
INSPECTORATE GENERAL.  
MDCCCLXXX.



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**MDCCCLXXX.**

# **National Oceanic and Atmospheric Administration**

## **Environmental Data Rescue Program**

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INSPECTOR GENERAL'S Circular No. 19 of 1870.

INSPECTORATE GENERAL OF CUSTOMS,

PEKING, 31st December 1870.

SIR,

1.—It has been suggested to me that it would be well to take advantage of the circumstances in which the Customs Establishment is placed, to procure information with regard to disease amongst foreigners and natives in China; and I have, in consequence, come to the resolution of publishing half-yearly in collected form all that may be obtainable. If carried out to the extent hoped for, the scheme may prove highly useful to the medical profession both in China and at home, and to the public generally. I therefore look with confidence to the co-operation of the Customs Medical Officer at your port, and rely on his assisting me in this matter by framing a half-yearly report containing the result of his observations at.....upon the local peculiarities of disease, and upon diseases rarely or never encountered out of China. The facts brought forward and the opinions expressed will be arranged and published either with or without the name of the physician responsible for them, just as he may desire.

2.—The suggestions of the Customs Medical Officers at the various ports as to the points which it would be well to have especially elucidated, will be of great value in the framing of a form which will save trouble to those members of the Medical profession, whether connected with the Customs or not, who will join in carrying out the plan proposed. Meanwhile I would particularly invite attention to—

a.—The general health of.....during the period reported on; the death rate amongst foreigners; and, as far as possible, a classification of the causes of death.

b.—Diseases prevalent at.....

c.—General type of disease; peculiarities and complications encountered; special treatment demanded.

d.—Relation of disease to { Season.  
Alteration in local conditions—such as drainage, &c.  
Alteration in climatic conditions.

e.—Peculiar diseases; especially leprosy.

f.—Epidemics { Absence or presence.  
Causes.  
Course and treatment.  
Fatality.

Other points, of a general or special kind, will naturally suggest themselves to medical men; what I have above called attention to will serve to fix the general scope of the undertaking. I have committed to Dr. ALEX. JAMIESON, of Shanghai, the charge of arranging the reports for publication, so that they may be made available in a convenient form.

3.—Considering the number of places at which the Customs Inspectorate has established offices, the thousands of miles north and south and east and west over which these offices are scattered, the varieties of climate, and the peculiar conditions to which, under such different circumstances, life and health are subjected, I believe the Inspectorate, aided by its Medical Officers, can do good service in the general interest in the direction indicated; and, as already stated, I rely with confidence on the support and assistance of the Medical Officer at each port in the furtherance and perfecting of this scheme. You will hand a copy of this Circular to Dr. ...., and request him, in my name, to hand to you in future, for transmission to myself, half-yearly reports of the kind required, for the half-years ending 31st March and 30th September—that is, for the Winter and Summer seasons.

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I am, &amp;c.,

(signed)

ROBERT HART,

I. G.

THE COMMISSIONERS OF CUSTOMS,—*Newchwang, Ningpo,*  
*Tientsin, Foochow,*  
*Chefoo, Tamsui,*  
*Hankow, Takow,*  
*Kiukiang, Amoy,*  
*Chinkiang, Swatow, and*  
*Shanghai, Canton.*

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1879.]

MEDICAL REPORTS, NO. 18.

v

SHANGHAI, 1st June 1880.

SIR,

IN accordance with the directions of your Despatch No. 6 A (Returns Series) of the 24th June 1871, I now forward to the Statistical Department of the Inspectorate General of Customs, the following documents:—

Cholera Epidemics in Japan, pp. 1-30.

A.—Additional Notes on *Filaria Sanguinis Hominis* and *Filaria* Disease at Amoy, pp. 31-51.

B.—Lithotomy Statistics from Canton Native Hospital, pp. 52-55.

C.—Report on the Health of Canton for the half-year ended 30th September 1879, pp. 56, 57.

D.—Report on the Health of Amoy for the year ended 30th September 1879, pp. 58, 59.

E.—Report on the Sanitary Condition of Wênchow for the year ended 31st March 1879, pp. 60-63.

F.—Report on the Health of Tamsui and Kelung for the year ended 30th September 1879, p. 64.

G.—Report on Health Conditions in Foochow, pp. 65-70.

H.—Report on the Health of Chefoo, pp. 71-74;

I.—Report on the Health of Swatow, pp. 75-79;

K.—Report on the Health of Shanghai, pp. 80-82; each of these referring to the half-year ended 30th September 1879.

I have the honour to be,

SIR,

Your obedient Servant,

R. ALEX. JAMIESON.

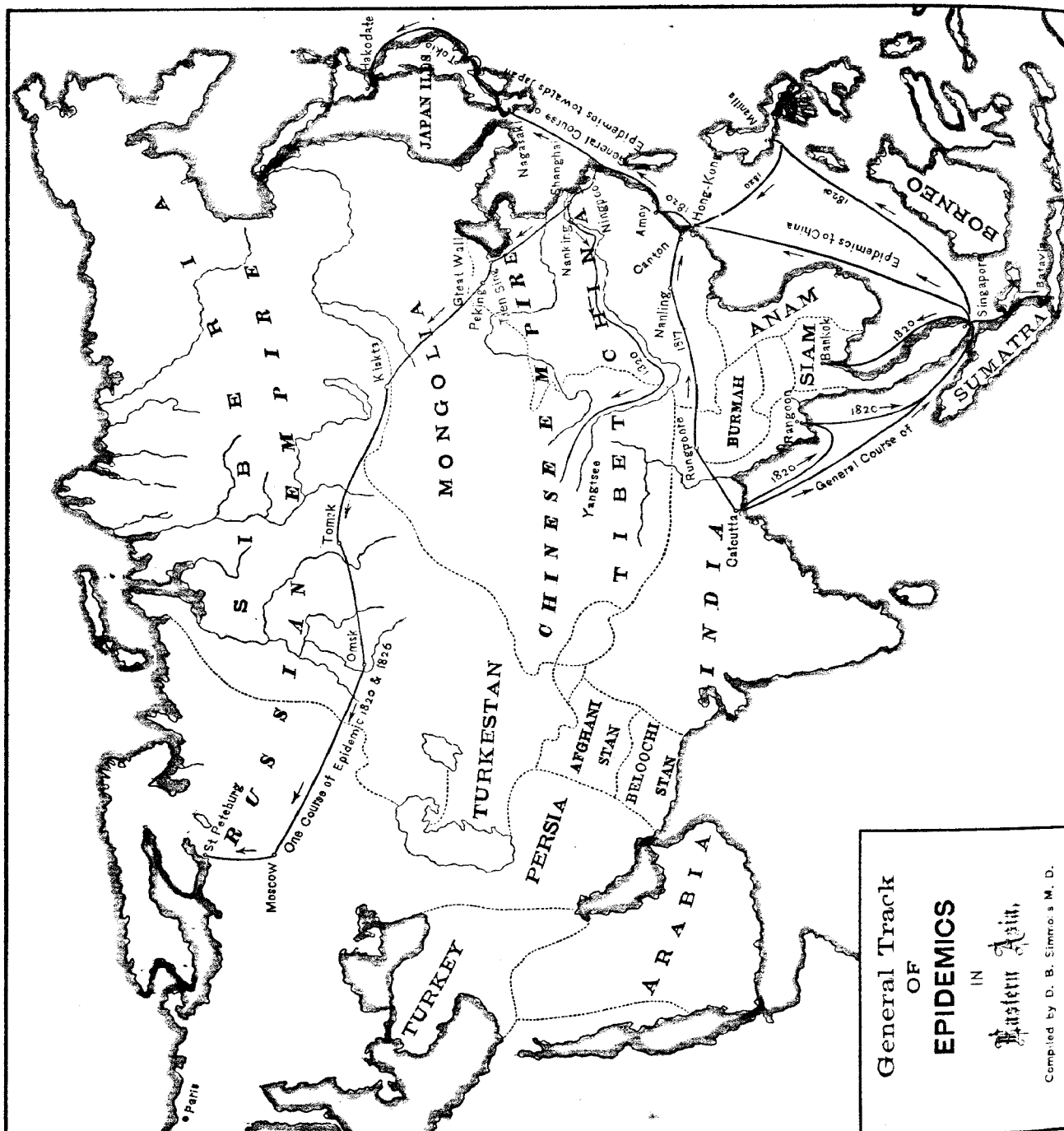
THE INSPECTOR GENERAL OF CUSTOMS,  
PEKING.

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# CHOLERA EPIDEMICS IN JAPAN.

WITH A MONOGRAPH ON THE INFLUENCE OF THE HABITS AND CUSTOMS OF  
RACES ON THE PREVALENCE OF CHOLERA,

By D. B. SIMMONS, M.D.,

*Physician and Surgeon to the Ken Hospital, one of the Physicians to the Cholera  
Lazaret, and Chairman of the Yokohama Foreign Board of Health.*

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## CHAPTER I.

### *Epidemics prior to that of 1877.*

INTRODUCTION.—MACPHERSON, a well-known writer on cholera, says that it is "one of the oldest diseases whereof a distinct description exists," and that there are "few disorders respecting which such an uninterrupted chain of evidence has been preserved." Granting this, when we come to review the literature of the subject, especially that part of it which has reference to Eastern Asia, we are at once struck with the small number of widespread epidemics which are recorded as having penetrated thither from early times, as compared with those which travelled in an opposite direction, and often arrived even in the heart of Europe. Why China and Japan, situated eastward of the Indian source of the scourge, should have escaped its visitations when it ravaged Beloochistan, Persia, Arabia, and other countries to the west, is not at first glance apparent. Certainly the natural barriers in the former direction are not more formidable than those in the latter; while the habits of the people of China, and the condition of the walled towns into which many of them are crowded, would seem to be eminently adapted to foster and propagate the malady. A question which naturally suggests itself here is: Can this exemption be real, or is it only apparent? and I think that a solution is within reach. One author, on the subject of cholera in the Far East, says: "Its literature in the annals of those countries is exceedingly meagre; and the earlier writings which do exist on the migratory and contagious character of the disease have heretofore escaped all but cursory notice." The explanation which he offers is that "exact knowledge of the branches of medicine is more rare" in China and Japan, "where the received opinions in regard to epidemics of any kind, from the nature of the subject, would be founded upon superstition and supernatural manifestations." For my own part, I think that there is good ground for the belief that lack of evidence of numerous visits of the evil is fair negative proof of the infrequency of its appearance, especially in countries so rich in historic records as are the two remotest empires of the Orient.

Admitting this, and, in the case of China at least, many apparent predisposing inducements to the introduction and spread of cholera, an explanation may be found in the utter insignificance of the flow of life eastward from India, as compared with the enormous migrations, commercial, religious, and military, which for centuries streamed in the contrary direction from the country where Asiatic cholera is born. For generations the flood tide of travel tended westward, in caravans of merchants and pilgrims, toiling wearily onward, and armies moving still more slowly. These are the universally recognised means for the spread of disease by land. Their fatal work was also supplemented by sea through fleets of crowded and imperfectly equipped coasting vessels, whose course much more rarely lay in the direction of these waters. It will further be observed that epidemic cholera seems to have become far more prevalent in these regions in modern than it was in ancient times, a fact which I venture to explain by the much more frequent and rapid communication that now exists between its Indian home and lands nearer to the rising sun. The western advantages of steam transit conferred upon their peoples have probably been for something in the transport of the seed of the great zymotic destroyer, in a fructifying state, by way of intervening islands and peninsulas, to the shores of China and this still more distant empire.

CHINA.—As the history of cholera in Japan is intimately dependent upon the presence of the same disease on the near mainland, I will briefly review what has been chronicled concerning epidemics in China, before I proceed to notice its known visits to these islands. The first mention which I have been able to find of cholera prevailing in China as an epidemic disease is made by CLEYER,† who states that it appeared in 1669, and that it had probably been brought from Malacca. The next notice is by GENTIL,‡ who, in his *Voyage aux Indes Orientales*, alludes to cholera as being in the Coromandel in 1761 and 1769, and states that shortly after the latter date it was present in China. The epidemic of 1817, which had its origin in Bengal, extended up the Ganges as far as Allahabad; and up the Bramapootra from Dacca, north-east to Ringpore, whence it travelled to the borders of Thibet and South-western China. In 1820 it again appeared in the latter country—first at Canton. This particular epidemic originated on the eastern coast of Hindustan; thence it was carried by English troops to Burmah, during the war with that nation; thence to Bangkok and Canton, from which *foci* it penetrated into the interior of China, by direct route. Again radiating to Ningpo, and following the course of the Yangtze, it travelled by this track also into the very heart of the empire. In 1821 it reached Peking, where it reproduced itself in 1822 and 1823, and formed the centre of infection in Northern Asia. In 1826 it was again borne from India to China. It once more reached Peking, whence, steadily advancing, it crossed the Chinese wall, swept through Mongolia, and eventually travelled to Moscow. In 1840 the Government of India despatched a combined European and native army to China in the interest of the opium trade.§ This force carried with it the seeds of cholera, which not only arrived at Peking, but followed the track of the caravans westward as far as Russia. In the statistical report of the health of the British Navy for 1868, we find that in

\* The fact that this year, while Japan has been overrun by a disastrous epidemic, her densely populous neighbour, still nearer to the cradle of the disease, has escaped, has led me to consider whether these "inducements" may not, after all, be more apparent than real. The present, however, is not the place for the consideration of a subject, which is of sufficient interest and importance to call for a chapter to itself.

† *Cholera Epidemic of 1873 in the United States*, p. 525.

‡ *Ibid.*, p. 527.

§ An unwritten chapter.

1841 the disease appeared in a malignant form in Ningpo, and that in 1842-3 it was more than usually prevalent in the British East India squadron. For the next 15 years no record appears of the disease in an epidemic form in any part of China. In 1858, however, it again appeared, according to the last-quoted report, and continued to do so year after year until 1867. Twice during this period it reached Japan, once in 1858 and again in 1861-2. Between 1867 and 1877 there is no account of any epidemic of the disease in any part of this country or the adjacent empire.

An interesting notice of cholera epidemics in Peking, and of Chinese descriptions of the nature and treatment of the disease, will be found in Dr. JOHN DUDGEON's Report on the Physical Conditions of Peking (pp. 39 and 40 of Imperial Chinese Customs *Medical Reports* for April-September 1872).

JAPAN.—In this empire, as in China, we find the early history of cholera quite obscure. KAEMPFER speaks of it vaguely as "frequent and fatal," but does not record the history of any particular epidemic; and, indeed, the diversity in the dates assigned to even recent periods of its appearance by the most reliable sources of direct information, would render it, if we were simply dependent upon them for guidance, extremely hazardous to attempt to decide with even approximate certainty upon the times of its visitations; but a comparison of local accounts with the chronicles of the disease in other parts of Eastern Asia, its usual source of importation hither, will enable us partially to overcome this difficulty. One Japanese authority gives 1817, 1854, and 1861-2 as years when epidemics occurred, while another fixes the dates 1819, 1821-2, and 1858-9 as pestilential seasons. Although the great epidemic of 1817 had its origin in India in that year, it did not reach Java until 1819, and China until 1820. These being the only points in Eastern Asia in communication with Japan at that time, its prevalence here could not have been earlier than 1819. The dates 1821-2 are undoubtedly correct, since the disease was epidemic along the whole China coast during that period, as already stated. Respecting the year 1854, available information is conflicting. Some of the oldest and most intelligent native doctors, including especially one who has written somewhat lengthily on the subject, have no recollection of the existence of the disease at that time. In a paper read by Dr. WILLIAM R. E. SMART, C.B., before the London Epidemiological Society on the 12th March 1873, we find, however, the following paragraph:—"In 1854 it (Japan) suffered most intensely in most of its cities, the disease (cholera) having been imported, it is said, by the United States frigate *Mississippi*, after which endemo-epidemics showed themselves in Yokohama through a long succession of years at one season of the year." I am quite at a loss to reconcile this assertion with the statements of the native medical men; and am farther disinclined to accept it as true for the two following reasons: first, no mention is made of the existence of the disease, either on board the squadron (the *Mississippi* being one of the vessels comprising it) or ashore, in the report of Commodore PERRY's expedition; secondly, no note of the presence of the scourge at this time in North-eastern Asia has been taken by the medical officers of the British Navy. I have no means of verifying or contradicting the statement in regard to its yearly endemo-epidemic appearance in Yokohama previous to 1858. I neither saw nor heard anything specific and definite of cholera in 1859, the year of my arrival here, nor in 1860. Of the epidemics of 1861 and 1862 I shall write a few lines farther on. Since the latter year no traces of the disease, either in this

place or in other parts of the country, were observed, until the epidemic of last year declared itself. Further, so far from cholera being a domestic epidemic disease in this empire, a singular freedom from bowel troubles of all kinds is noticeable, especially in the northern provinces. I must not, however, omit to mention that, as concerns the year 1858, cholera was then epidemic in China, so that its appearance here at that date could be easily accounted for, especially as the official report states that *some* epidemic of great severity then prevailed, a statement further confirmed from private sources.

As for 1861 and 1862, the disease was then raging, as already stated, in many parts of China. This country was at that time open to foreign trade; and communication was constant, both by steam and sail, with continental Asia. No measures, as indeed is still the case, were taken to prevent the importation of the disease, and the result, as I have every reason to remember, from weeks of day and night work, was a terrible epidemic, attended with great loss of life. An epidemic of measles, brought into the country for the first time in 27 years (it was introduced by a foreigner, no less a personage than the English Chargé d'Affaires), had immediately preceded that of cholera. The consequence was that many persons were attacked by the latter before they had fully recovered from the former malady. For this cause, according to impressions formed at the time, I consider that a much higher mortality rate was reached than is usual from cholera alone. The subject of establishing a quarantine, or taking some means for preventing the importation of contagious diseases into the country by means of ships, was discussed at this period; and I then met, at the United States legation in Tokio, by request of the Japanese government, a delegation of medical men appointed by the Tycoon for the purpose of drafting some regulations on the subject. As, however, the epidemic had by that time nearly exhausted itself, and the moment of immediate necessity for enforcement of stringent preventive measures had passed away, nothing came of this conclave's deliberations.

From 1862 until 1877, or during a period of 15 years, no case of cholera is known to have occurred here, notwithstanding that the disease did not entirely cease its ravages in China until 1867—five years later than its temporary disappearance from Japan.

I subjoin extracts from a translation, which recently appeared in the *Hiogo News*, of a native "brief history of cholera" in this empire.

In the summer of the 6th year of Shōtōku (2376, era of Jimmu) (A.D. 1718), in the reign of Nakamikado Tennō, and during the rule of the Shōgun Yoshimune, fever prevailed, and the mortality in the city of Great Yedo exceeded 80,000 per month. Owing to the rapid spread of the disease and the number of deaths, the carpenters were unable to keep pace with the demand for coffins, and empty *saké* casks had therefore to be employed for the purpose. The graveyards were at length all filled up, no space remained for more burials, and the priests of the various sects refused to permit the interment of the remains, insisting that the bodies should be burned, and only the ashes be buried.

At the various cremation grounds, therefore, coffins in countless numbers were seen piled on top of each other, the burning of bodies being done in regular succession, according to the order of their arrival. Numbers of corpses, mostly of poor persons, had to be left unburnt for upwards of half a month, and the head-man of the ward was at his wit's end what to do in the matter. The government was therefore asked for instructions, and an order was issued that the bodies should be wrapped in coarse mats, and that (after the performance over them of a brief religious ceremony) they should be conveyed in boats to the Bay of Yedo, and sunk in the sea.

This we read in the *Shokio Kanki*, and we may judge from the virulence of the disease that it was quite different from ordinary fever. We are inclined to think that it was what we now call cholera, and that this was the first appearance of the pest in our Toyoashihara ["fertile sweet flag plain"—Japan]. We, however, invite an expression of opinion from antiquarians.

Again, in the 5th year of Ansei (2518, era of Jimmu), during the reign of Komio Tennō, and at the time when Iyeshige was Shōgun [A.D. 1850], an epidemic prevailed in Yedo, as many persons will recollect. This disease first manifested itself in the neighbourhood of Akasaka, in the beginning of the 7th month of that year; according to some, it was brought from the Tokai-do. Reiganjima became infected, and soon it spread in all directions. During the first half of the 8th month the epidemic raged most furiously. At the gates of every temple there were hills of coffins; the men who worked at the cremation furnaces in the evening were themselves changed into smoke the next morning, and the tombstone-cutter of one day found his own name carved on a stone on the morrow. The panic amongst the populace beggared description. The epidemic was regarded with even far greater dread, by both high and low, than is the prevailing one in this 12th year of Meiji, for medical knowledge was in such a crude state that no one was able to ascertain the cause of the disease, and the people could do nothing but sit down in dread suspense and await the approach of death.

The disease was generally attributed to diabolical agency; hence the people gave it the name of *ko-ro-ri*, that is, "fox, wolf, and badger." It was also believed that all water and all fish were poisoned, so that people dared not draw water even from the pure stream of the upper Tamagawa, nor eat any fresh fish, even when it was brought to their doors alive. Each one adorned his gate with branches of pine and bamboo, and straw ropes, and prayed that so dreadful a year might pass away as quickly as possible; some praying to the *kami*, and some to Buddha. The whole city was filled with horror and dismay, and a state of things existed to which that in Osaka at the present time bears but a faint resemblance.

If we may believe the *Ri-riu-koki*, or *Record of the Ravages of Dysentery*, which was published in the 9th month of the 5th year of Ansei, there were then in Yedo 1,775,215 houses, and a population of 7,101,318. The disease was most virulent between the 1st and the 30th of the 8th month, during which space of time the number of deaths was 12,492, as appears from the statistics of death reported to the Government daily. Besides these, 18,737 persons, whose names had not been properly registered at the ward offices, died. For the first three or four days in the beginning of the 9th month there were 50 or 60 deaths daily; after that the number gradually decreased, and at length the disease entirely disappeared, and tranquillity was once more restored.

\* \* \* \* \*

Sanitary measures and other necessary precautions are now undertaken by the government, and the people have nothing to do but obey its orders, and take care of their health. Even in the period of Ansei certain precautions were observed, so that those who ignore the sanitary regulations made by the present government of Meiji are not only offenders against it but also against the late Bakufu.

We give below a copy of a notification issued by the Bakufu in the 5th year of Ansei (A.D. 1850), that our readers may learn what measures were taken to combat the disease at that time:—

For the prevailing disease of sudden purging there are various methods of treatment, amongst which the undermentioned is notified for the benefit of the people. In the way of precaution, avoid exposing your body to cold air, always wear a cotton belt round your abdomen, be careful to avoid gluttony and excessive drinking, and the eating of indigestible food. If symptoms of the disease appear, go to bed, be extremely careful of what you eat and drink, keep the whole body warm, and take the medicine called *hoko-san*, as prescribed below; many valuable lives have been saved by it alone. If you vomit and purge much, and your body becomes cold, put 2 *monme* of refined camphor into 2 *go* of spirit (*sho-chiu*), warm the mixture over the fire, dip a cotton cloth in it, and rub the body and limbs briskly. Then put a mustard plaster over the stomach every half-hour. To make *hoko-san*, mix together powdered cinnamon, *yekichi*, and dried ginger, in equal quantities, and boil; drink at intervals, one or two cupfuls at a time. To prepare the mustard plaster: mix together powdered mustard seeds and wheaten flour, pour in vinegar, and mix well. Spread the mass over

a cotton cloth, and apply to the stomach. In urgent cases, when time is precious, use mustard only, mixing it with hot water. Another medicine : into a certain measure of hot tea pour about one-third the quantity of spirit, add a little sugar, and drink. The patient must shut himself up in a close room, and rub his body with a cotton cloth that has been soaked in spirit. If his extremities are cold, warm them with hot stones until he perspires.

The above is a course of treatment which may be applied with benefit in the case of anyone attacked by the prevailing disease. This is notified to all.

8th month of the Year of the Horse.

## CHAPTER II.

### *History of the Arrival of the Epidemic of 1877.*

In order to ascertain the source of the visitation and the probable means by which the scourge was imported into Japan in 1877, it will be necessary to refer briefly to what is known of its existence and progress in China immediately beforehand. This I am enabled to do by means of the *Medical Reports* of the Chinese Imperial Maritime Customs, No. 14, April to September 1877. The work is specially important because of the questions raised in this neighbourhood, at the time the intelligence first reached us of the prevalence of the disease in China, as to whether the complaint was really Asiatic or epidemic cholera. It is also valuable because it once more points to the necessity at all times of the immediate institution of some measures, on the receipt of reliable information, for the inspection of ships coming from infected ports, and their detention when requisite in quarantine, regardless of the objections of a few shipowners or agents, and of those otherwise engaged in commercial transactions. Neglect to take precautions in the autumn of 1877 cost this country many valuable lives then; and has beyond doubt been the first cause, through direct succession, of the far more serious disasters of 1879.

The first cases of the disease on the coast of China appear to have manifested themselves in Amoy, as will be seen by the following extracts from the report communicated by Dr. DAVID MANSON, Customs Surgeon at that port:—

The first intimation of cholera was a request by the Spanish Consul-General to examine the body of a Manilaman who had died suddenly, with a history of vomiting, purging, cramps and collapse, on the 20th June. His sudden death was the cause of the request for a *postmortem* examination. *On enquiry among the Chinese I learned that since the first week in June many deaths had occurred from a similar affection.* On Monday, 25th June, I saw in a dirty boarding-house a Japanese sailor collapsed from cholera. . . . . During these few days at the latter end of June and throughout July, Chinamen were frequently to be seen in the streets of the foreign concession in different stages of the disease . . . . . The first week in July the Chinese reported the mortality at from 10 to 100 daily . . . . . The disease was no longer confined to one part of the town, it had spread over the whole native city . . . . . On 2nd July one of the marines on board H.M.S. *Hornet* was attacked . . . . . and died at 3 P.M. On 3rd July a sailor from the *Hornet* was admitted to hospital in a state of collapse; he recovered . . . . . Among the Chinese the disease is reported to have spread to the large cities in the neighbourhood of Amoy, and the mortality was very great . . . . . The probable mortality at the height of the epidemic was 75 per diem, possibly 100. The total mortality among the Chinese was about 1,600 in a population of 80,000 . . . . . At the height of the epidemic it was not possible to move about much out of doors without encountering several cases, either on the roadside, in the streets, or in sampans.

Dr. JAMIESON's report for Shanghai contains the following:—

The first case occurred in June and was fatal. The alarm was given on the 2nd July by a telegram to the Commissioner of Customs, reporting the presence of cholera in a very fatal form at Amoy . . . . In August there were two deaths (among foreigners) . . . . Early in September cholera reached Nagasaki and spread thence to Kobe and Yokohama . . . . In the visitation of this year (1877), there were, as far as I can ascertain, 22 cases (among foreigners), of which 16 died . . . . It is certain that cholera was prevalent and fatal in the city and native quarters of the settlements during August and September.

Dr. J. R. SOMERVILLE, Customs Surgeon at Pagoda Anchorage, Foochow, reports as follows:—

The total mortality (by cholera) in and about Foochow is estimated by the Chinese at from 5,000 to 7,000. The disease still continues (November 9th).

Early in the summer I was informed by a medical man, who had been a long time in practice in Saigon, that cholera was epidemic there when he had left but a few days before. The U.S.S. *Saco*, while on a cruise among the Philippines in 1875, had cholera on board. Dr. AYRES, of the U.S.S. *Ashuelot*, also informed me that he found cholera prevalent and fatal in most of the Chinese ports during the whole of the summer of 1877.

The first intimation received by the Japanese government of the existence of cholera in China was by a telegram from their Consul in Amoy, bearing date the 7th of July. The despatch stated that the disease had appeared in that place some days before, or about the 27th of June. In the meantime the English Minister in Tokio telegraphed an inquiry to the Hongkong authorities as to what action had been taken by the government of that colony in the matter. A reply was received to the effect that the colonial authorities did not consider the disease in Amoy sufficiently severe to justify the declaration of quarantine. This fact was communicated to the Japanese ministry, whereupon the enforcement of the rules of a convention agreed to four years previously was indefinitely postponed; and ships from the infected ports were allowed to enter the treaty ports of Japan without even submitting to a preliminary examination.\*

It was, however, and notwithstanding the assurance given, deemed prudent by the Japanese government, in view of the great severity of former epidemics, to take all available precautions to stay the progress of the disease in the event of its entering the country. Temporary cholera hospitals were built at the open ports with all possible despatch, and general information respecting prophylactics and the proper modes of treatment was diffused among the people by means of the newspapers and printed pamphlets.

Under circumstances the most favourable for observation it is often very difficult to fix upon the exact vehicle by means of which cholera gains an entrance into a country. So we find it in regard to the epidemic of 1877. Even the government, after several months devoted to the investigation of the subject, succeeded in arriving at no more than an approximation to the facts.

\* When it was thus announced that no quarantine had been established in Hongkong, it was not thought necessary to add that a health officer is there employed, supposed to inspect all vessels entering the harbour, and to isolate those having cases of infectious disease on board. Nor was it stated that these precautionary measures mean, in case of danger, the enforcement of the sanitary regulations of the colony, and are calculated to be in all respects equivalent to a quarantine, though they may not pass by that name.

Grave difficulties, in addition to the absence of quarantine regulations and universal inspection of ships coming from infected ports, were occasioned by the Satsuma rebellion, then at its height. In the history of cholera everywhere, war has been one of the most potent instruments for the transportation of the disease. The necessities of campaigning defy all ordinary rules, sanitary or other. But though the insurrection was no doubt responsible for the spread of cholera in and about the neighbourhood of the scene of strife, it can in no way be accused of originating the epidemic, which, as the facts enumerated in the Chinese Customs reports already quoted tend to establish, must have come first from China to Nagasaki, whence it afterwards spread to two other open ports, Hiogo and Yokohama.

In reply to an enquiry by letter addressed to Dr. C. L. FISCHER, U.S. Consul at Nagasaki, as to the origin of cholera in that place, I received the following reply:—

Some time in August it (the disease) first made its appearance in a little village inhabited by washmen that attended the shipping. The next day it made its appearance in another village half a mile distant, also inhabited by washmen. On the same day it also appeared on board an English man-of-war then lying in this harbour. Three days later it appeared on board of our U.S. naval vessel. The latter had two cases, one proving fatal. The English man-of-war had four cases, two proving fatal. There were other cases reported among the merchant shipping, some I believe fatal. None of the foreign residents were attacked. As to where it first came from is a question not yet settled, but the close appearance of the same on shore and on the English man-of-war gives a shadow pointing to its importation by that vessel.

I have also been informed by the captains of three of the steamers in the government transport service, who were in Nagasaki at this time, that they believed the disease was brought to that place from Amoy by an English man-of-war. On the other hand, I am confidently informed by Dr. LAMBERT, lately resident Staff Surgeon in H.B.M.'s Naval Hospital at Yokohama, that the only case of cholera on an English man-of-war in Nagasaki, during the season in question, occurred on H.B.M.S. *Juno*, on the 8th of September, in a man who had broken his leave, and consequently brought the disease from the shore to the ship.

The following abridged extract is from the log of the late Captain VROOM, then of the *Shinagawa Maru*, of the Mitsu Bishi Mail Steamship Company, at that epoch employed in the government transport service, showing the early appearance of the disease on board his steamer:—

September 4th.—A few hours after leaving Nagasaki for Kagoshima, with several hundred of the war police, my engineer died of cholera. Within four days 90 of the force succumbed to the disease; and, subsequently, 110 more.

There can be no reasonable question that the engineer and the 90 others who immediately followed him contracted the disease in the town of Nagasaki. I am therefore strongly disposed to accept the statement of Dr. FISCHER as to the existence of the epidemic in that place in *August* as correct, thus necessitating the dating back of all other reports as to the first appearance of the disease. Further, I find the theory of direct importation from China, or other than by way of Nagasaki, to Yokohama unnecessary; and I hold to the opinion that cholera was brought hither by one of the steamers, then almost daily leaving the south-west for this and other northern ports.

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## CHAPTER III.

*Appearance and Progress of Cholera among Natives in Yokohama in 1877.*

Although I may confidently say that I expected the disease to arrive in Yokohama before the season should be over, this expectation was not supported by the usual forerunner of great cholera epidemics, namely, the general prevalence of bowel complaints, which in this instance were only noticeable to the usual extent observed at the same period of the year; and are always readily accounted for by the general use of unripe or unwholesome fruits.- My anticipation was, however, unfortunately verified. The first case of cholera was that of the wife of a builder's coolie, and occurred on the 5th September in the suburb or adjoining village of Kanagawa. The woman presented all the symptoms—vomiting, purging, cramps and collapse—characteristic of the true disease, and died in about 24 hours from the time of seizure. On the 7th, two days later, the remaining members of the family, consisting of the husband, grandfather, and son, were attacked. The husband and grandfather died the next day, with all symptoms of cholera; and four days later, on the 11th, the son also expired. No more cases occurred, as far as could be ascertained, in the immediate vicinity of this family, which furnished the first four victims. The fifth case occurred on the 9th, and was that of the wife of the Assistant Judge of Yokohama, whose house was situated on Ise Yama, between two and three miles distant from the tenement in which the first case appeared, and on the opposite side of the bay. No communication appears to have taken place between these two centres of disease. This lady died within 24 hours, presenting all the true symptoms. The sixth case was that of the sister of the last-mentioned sufferer. She had been acting as nurse to the patient, and died on the 12th, a few hours after being attacked. Case 7 was that of a coolie master living near the iron bridge, who was taken in the morning, and died seven hours later. The distance between this locality and that furnishing the previous two cases is about three-quarters of a mile, and three miles from that of the first four. Between none of them could any connexion be satisfactorily traced. Case 8 was a woman living in Tobe, in still another quarter of the town. She died on the 14th, after a few hours' illness; but her son (Case 9), who was attacked on the day of her death, recovered. Case 10 was that of a neighbour of Case 8, a woman who had visited her during her illness. She died on the 15th, with all the symptoms of cholera. Case 11 was a woman in a street leading to the Yoshiwara; occupation, vendor of old clothes; died on the 15th.

From this time the cases increased rapidly in number in various sections of the town. It is a curious circumstance that, with one exception, the persons first taken in the different localities were women. I can only suggest the following explanation for this. Near the place where the first case, that of a *man*, occurred is a small temple much frequented by women, on leaving which it is their custom not only to dip their fingers in water, contained in a stone basin, as part of their form of devotion, but often to wash their mouths with it, or even to swallow a small portion. The mystery would be solved by supposing the water of the basin to have been contaminated with cholera germs. The well which furnished the liquid for the basin may have been the same as that used by the man who died of the disease in the neighbourhood. The first cases observed were nearly all fatal, only one of the 11 above mentioned having recovered.

My official report of the real nature of the disease was dated the 15th September, although I had been watching its progress for 10 days previously. On the following morning a large number of the native physicians were assembled at the Nogé Local Government Hospital, where I gave some general instructions as to the management of cases that might fall into their hands, with a simple prescription for use during the premonitory diarrhœa. An order was then issued for making up medicine, and its free distribution to all who might require it. On my report being forwarded to the Department of the Interior, an appropriation of 5,000 *yen* (dollars) was immediately granted to the Kanagawa Kencho\* for the local health board, with an order to make use of it in preventing as much as possible the spread of the disease. The most vigorous measures were instantly inaugurated to that end. Within four days, or on the 19th September, the temporary hospital already prepared at Ota, in the suburbs, commenced to receive such cases as could not be properly cared for in their own homes. A special police force was detailed, and physicians with necessary medicines were placed in attendance at the several police stations, where it was ordered that all new cases of cholera should be reported. Notices were posted on the main entrance of the residences of affected persons, announcing the existence of the disease on the premises. Carbolic and sulphurous acids were the disinfectants used. So determined were the authorities in their endeavours to eradicate the disease, that in a large majority of cases the matting, bedding and clothing of those attacked were destroyed by fire, and, in the case of the extremely poor, replaced by new, at the expense of the government. When death occurred the corpse was cremated. Public water-closets and drains were thoroughly disinfected, and an examination of the wells instituted. Those found to contain impure water were immediately closed. A brief monograph containing information regarding the disease, its prophylaxis and proper treatment, was prepared by me, and placed by the authorities of the prefecture within reach of all. In this the use of boiled water only for drinking was urgently recommended. The preventive means taken in Tokio and other large cities were also vigorous, the general plan adopted by the Yokohama board being followed elsewhere. In the foreign concession of this port a health board was also organized, and consisted of all the foreign medical men (but one, who refused to act) and a number of laymen.

This being the first attempt made by the Japanese government to combat the scourge by scientific measures, the liberality, promptness, and disregard of the usual official retarding formalities, displayed in the appropriations, deserve the greatest praise.

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#### CHAPTER IV.

##### *History of the Epidemic of 1877 among Foreigners in Yokohama.*

From the proximity of the native town to the foreign settlement, and the constant intercourse between the two, foreigners, as might have been expected, did not entirely escape. Their

\* Office of the prefecture.

better hygienic condition, however, and the intelligent precautions used against the known predisposing and exciting causes were effective in confining the malady among them to a few cases. In the concessions the great danger of contracting the disease existed in the communication of servants with the native town, or through waiters or day servants, by means of whom it might be, and is known to have been, brought upon certain premises, even without the knowledge of the masters, there to germinate, and form a focus of infection not only for all members of the establishment but for the inhabitants of the neighbourhood. The probable cause of the disease among foreign seamen afloat in the harbour was their imprudent visits to the native town, and their consumption of water and stale fruits there, thus subjecting themselves to the same sources of infection as were fatal to the natives.

The first case was that of a ship captain named JORDAN, who was living in a quarter of the native town severely affected by the disease. He died on the 25th September, on the second day after being attacked. The second case manifested itself in the main street of Yokohama, and was fatal on the 29th September; and the third occurred in the same abode, and ended fatally on the 1st October. The infection was brought to this house by a Japanese tailor who spent his nights in the native quarter. The fourth deadly case was that of Dr. MASSAIS, a French practitioner, who died on the 9th of the same month. Between this and the 25th three fatal cases occurred among seamen from the harbour, and two other sailors died a few days after going to sea.

Total number of resident foreigners attacked, 12: died, 4; recovered, 8.

Total number of cases from the shipping: attacked, 6; died, 5; recovered, 1.

Total number of cases, 18: died, 9.

The efforts of the health board undoubtedly had much to do with the comparatively small number of cases in the settlement. The board instituted a careful inspection of the entire quarter, caused the abatement or removal of nuisances, and insisted upon a rigid looking after the water supply of private residences. A great deal of temporary anxiety was caused by the presence, in the very heart of the settlement, of a Chinese quarter. On the day that the outbreak was declared I selected, at the request of the Consuls, a committee of medical men to make inspection and report upon the condition of this region. It was found to be in a most wretchedly filthy condition; and immediate steps were taken to secure its being cleansed by the inhabitants. A liberal supply of sulphurous acid was poured daily into the drains and closets, a practice which was kept up during the whole prevalence of this epidemic. The water of the wells was so bad that no attempt was made by the residents to use any of it for drinking purposes, a much safer condition than if it had been less unpalatable. The drinking supply was, without exception, obtained from a running hydrant, fed by pipes from a neighbouring hill, and discharging in the middle of the quarter, and from two or three excellent wells outside. For this and perhaps other reasons, which I will consider later on, the very section of the town where the disease was expected to appear in its worst form escaped even better than the well-drained European settlement. Only one clearly authenticated case of cholera was reported from China Town.

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## CHAPTER V.

*General Character of the Epidemic of 1877.*

The visitation, all things considered, was a mild one. The "epidemic constitution" appears to have been in some respects wanting, as was indicated by the absence, already referred to, of prevalent diarrhoea. As the scourge spread, however, this form of sickness manifested itself more frequently, but not to the extent usually noticed during severe cholera epidemics. Cases of sudden collapse were comparatively few, and the more rapidly fatal cases were observed during the first part of the epidemic. Dysenteric symptoms appeared at the end of the first month, and typhoid symptoms towards the last. By a glance at the subjoined table kindly sent me by the National Health Board, the progress of the disease, death rate, etc., among the natives throughout the empire, will be readily seen, thus rendering it unnecessary to review this part of the subject here.

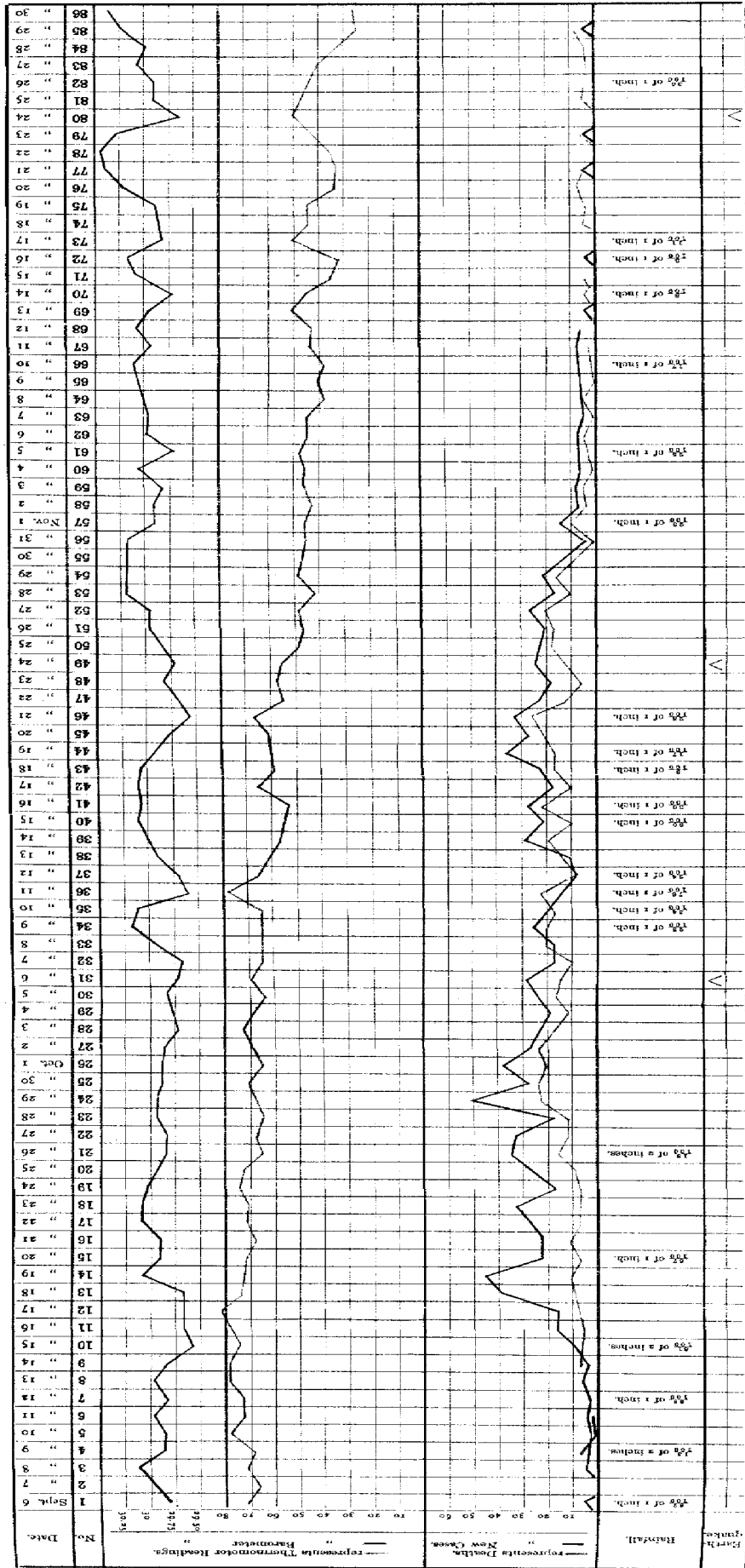
Some very interesting instances have been reported by my assistants, who had been sent out into the rural districts of this province to watch the advance of the pestilence, instruct the native physicians in its treatment, and circulate the monograph which I had prepared on the subject. One of these cases being of more than usual importance, I will specially record it.

A farmer brought a load of grain to market, and, having disposed of it, remained over night at the house of a merchant where a case of cholera had occurred a few days previously. On the second day after his return home, a distance of 15 or 20 miles, he was taken with violent vomiting and diarrhoea. His stools were thrown into a sluggish stream passing near his habitation and also flowing close by a number of houses some yards distant. Here cholera broke out a few days after the sufferer's return, no cases having appeared in that locality previously. Upon investigation it was found that the stream, during the periods of heavy rain, overflowed its banks, thus permitting its water to penetrate into the wells about; and, as no cases occurred above the first patient's residence, it is quite clear that the poison was disseminated in the manner indicated.

In Tokio its first manifestation was in the neighbourhood of the landing used by the crews of fishing boats from Yokohama, and the disease was most severe in the vicinity of the fish market; thence, again, the fish vendors carried it to different parts of the city. It is remarkable, however, that the total number of cases in the capital was very small when compared with those which occurred in Yokohama.

Observations as to the influence of rain on the progress of the epidemic showed that when showers were falling slowly no marked change was noticeable in the disease rate; but when the fall was heavy for a few successive hours, a rapid rise invariably followed on the fourth or fifth day afterwards. This I account for by the fact that the drains of the native town are surface ones, and that the excess of water caused them to overflow and contaminate the wells.

# Cholera Epidemic of 1877, with Meteorological Observations.



## CHOLERA EPIDEMICS IN JAPAN.

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TABLE NO. I.—CHOLERA RETURNS, 1877.

FU OR KEN.	Population.	Returns commenced.	Patients.	Dead.	Cured.	Under Treatment or Result unknown	Per cent. of Mortality	Patients in 10,000 of Population.
Tokio.....	881,421	September 15	647	509	115	23	—	—
Kioto.....	798,897	" 15	70	53	17	—	—	—
Osaka.....	553,777	" 22	1,619	1,228	389	2	—	—
Kanagawa.....	715,258	" 6	1,146	663	480	3	—	—
Hiogo.....	1,357,377	" 22	466	349	117	—	—	—
Nagasaki.....	1,173,263	" 2	1,446	653	470	312	—	—
Niigata.....	1,504,613	" 27	3	2	1	—	—	—
Saitama.....	912,528	" 21	29	6	13	—	—	—
Gumaba.....	554,888	October 3	3	1	2	—	—	—
Chiba.....	1,078,635	September 12	455	293	156	6	—	—
Ibaraki.....	875,491	" 23	26	25	1	—	—	—
Tochigi.....	543,245	October 3	1	—	1	—	—	—
Sakai.....	923,030	September 20	209	154	55	—	—	—
Miye.....	830,415	" 19	53	34	19	—	—	—
Aichi.....	1,267,206	October 1	2	2	—	—	—	—
Shidzuoka.....	976,405	September 3	40	29	11	—	—	—
Yamanashi.....	381,229	" 18	11	7	4	—	—	—
Shiga.....	721,099	October 7	28	19	9	—	—	—
Gifu.....	818,984	" 7	3	3	—	—	—	—
Nagano.....	973,959	" 28	—	—	—	—	—	—
Fukushima.....	765,115	September 16	—	—	—	—	—	—
Awomori.....	462,865	October 20	9	6	3	—	—	—
Akita.....	613,389	" 19	2	2	—	—	—	—
Ishikawa.....	1,825,507	September 26	16	10	5	1	—	—
Shimane.....	1,023,678	October 9	5	3	1	1	—	—
Okayama.....	784,621	September 27	135	103	25	7	—	—
Hiroshima.....	1,197,835	October 3	72	41	24	7	—	—
Yamaguchi.....	855,618	" 1	85	60	17	8	—	—
Wakayama.....	591,668	September 27	80	62	18	—	—	—
Yehime.....	1,403,693	October 3	111	55	41	3	—	—
Kochi.....	1,164,723	September 29	59	38	21	—	—	—
Fukuoka.....	1,070,244	" 10	430	312	118	—	—	—
Oita.....	718,816	" 30	147	79	68	—	—	—
Kumamoto.....	980,976	" 20	1,681	979	702	—	—	—
Kagoshima.....	1,209,162	August 12	1,022	553	460	9	—	—
Kaitaku.....	150,667	September 25	102	84	18	—	—	—
ARMY STATISTICS:—								
Nagoya garrison.....	—	October 10	30	5	25	—	—	—
Osaka Garrison Hospital.....	—	" 1	48	15	33	—	—	—
Hiroshima garrison.....	—	" 1	7	7	—	—	—	—
Kumamoto garrison.....	—	September 29	68	26	42	—	—	—
Marugame garrison.....	—	October 1	34	18	16	—	—	—
Osaka Temporary Hospital.....	—	" 1	152	89	63	—	—	—
Nagasaki " ".....	—	September 23	113	68	45	—	—	—
Kagoshima " ".....	—	" 14	577	300	277	—	—	—
Tokio, Kohinata Temporary Hospital.....	—	October 19	92	40	52	—	—	—
Kanagawa Infecting Hospital.....	—	" 18	75	51	24	—	—	—
Kobe Army " ".....	—	September 26	414	255	159	—	—	—
Kioto.....	—	October 1	326	154	172	—	—	—
Shiga.....	—	" 1	126	18	108	—	—	—
NAVY STATISTICS:—								
Tokio.....	—	September 7	1	1	—	—	—	—
Shinagawa.....	—	" 7	14	4	10	—	—	—
Yokohama.....	—	" 7	1	1	—	—	—	—
Yokosuka.....	—	" 7	16	5	11	—	—	—
Uraga.....	—	" 7	6	3	3	—	—	—
On Ships.....	—	—	6	6	—	—	—	—
MITSU BISHI:—								
On board Mitsu Bishi steamers..	—	September 15	59	25	26	8	—	—
TOTAL.....	32,660,297	—	12,378	6,508	4,447	390	52.58	3.79

## CHAPTER VI.

*The Epidemic of 1878.*

Although the epidemic of 1877 was, comparatively speaking, light, yet its reappearance in the following year was anticipated as almost certain by many well qualified to make a forecast. Unfortunately, their opinion was but too well founded. Early in the spring of 1878 a number of cases, as a reference to the subjoined table will show, occurred in Osaka.

In Yokohama only two confirmed cases of the malady appeared during the summer, and these were reported as sporadic cholera, or cholera morbus. On the 11th November, however, a case occurred in a portion of the town where the disease had prevailed most severely in the previous year; and this was followed by many others in quick succession in the same neighbourhood, one family of three persons falling victims to its ravages. The earlier of these cases were typical of the disease, not a single symptom being absent, and all proving fatal. With few exceptions, the scourge remained in the district in which it had revived. The last instance occurred on the 23rd January 1879. Total: cases, 33; deaths, 25.

In the harbour, a French man-of-war had three cases; and a Japanese vessel one. On shore, four foreigners, two of whom died, were attacked at short intervals. All the patients here indicated suffered from cholera, and not from some milder or other complaint.

The usual disbelief, which is, apparently, without exception, expressed whenever Asiatic cholera makes its appearance in or near communities of western peoples, at home or abroad, was again manifested. How inexplicable is the scepticism which obtains as regards cholera, but no other disease. No matter how high the authority which vouches for its first appearance, the truth is disputed by laymen and medical men alike. There is no parallel for this unbelief in the cases of other visitations. No one would dream of gainsaying a medical certificate of small-pox or typhoid fever, or the existence of those complaints in an isolated or an epidemic form, when vouched for by trustworthy persons competent to judge. Not so, however, with regard to cholera. No sooner does a doctor mention the fact of having a case in his charge, than even non-professional men begin to interrogate him as to the symptoms; and his statement is generally more or less discredited. For instance, the official reports show that a by no means inconsiderable number of cases of cholera occurred in 1878 in Nagasaki. Yet some of the resident Consuls and Surgeons of the men-of-war then lying in that port deny that the disease was present. I can only account for this anomaly by supposing that there are constitutional sceptics, men who distrust not only external testimony, but the evidence of their own senses: 'Neither will they be persuaded though one rose from the dead.' There is yet another class of people who imagine that it is always to their interest to maintain that no epidemic can be present. Such, perhaps, are some merchants, shipowners, and the officials of commercial powers, all of whom persuade themselves that they have reason to dread the obstruction to trade, were the truth to go abroad and be received by everyone without contradiction. For those in Japan who held such views, and supported them by pointing to the comparatively small ravages effected by cholera in 1877, and the still more trifling effects of the continuance of the same epidemic in 1878, the calamity of 1879 was needed to put them to silence by setting all their assertions and arguments at naught.

TABLE NO. 2.—CHOLERA RETURNS, 1878.

FU OR KEN.	Population.	Returns commenced.	Patients.	Dead.	Cured.	Under Treatment or Result unknown	Per cent. of Mortality	Patients in 10,000 of Population.
Tokio .....	881,421	June 18	8	4	—	4	50	—
Kioto .....	798,897	" 9	10	6	3	1	60	—
Osaka .....	553,777	January 12	26	12	4	10	46.15	—
Kanagawa .....	715,258	May 23	37	27	4	6	72.97	—
Hiogo* .....	1,357,377	June 26	—	—	—	—	—	—
Nagasaki .....	1,173,263	September 2	600	339	160	101	56.50	—
Saitama .....	912,528	February 7	3	3	—	—	100	—
Chiba .....	1,078,635	May 8	1	1	—	—	100	—
Ibaraki .....	875,491	July 20	1	—	1	—	—	—
Gumba .....	554,888	May 23	—	—	—	—	—	—
Sakai .....	923,030	June 22	5	5	—	—	100	—
Miye .....	830,415	August 3	1	—	1	—	—	—
Shidzuoka .....	976,405	July 17	4	2	2	—	50	—
Yamanashi .....	381,229	June 30	5	3	2	—	60	—
Shiga .....	721,099	September 26	1	—	1	—	—	—
Akita* .....	613,389	" 20	1	—	1	—	—	—
Shimane* .....	1,023,678	July 22	—	—	—	—	—	—
Hiroshima .....	1,197,835	August 5	1	1	—	—	100	—
Yamaguchi .....	855,618	" 4	4	1	3	—	25	—
Wakayama .....	591,668	January 19	42	15	11	14	35.71	—
Yehime* .....	1,403,693	July 15	—	—	—	—	—	—
Kochi .....	1,164,723	January 5	1	1	—	—	100	—
Fukuoka .....	1,070,244	September 13	5	4	1	—	80	—
Oita .....	718,816	May 7	3	2	1	—	66.66	—
Kumamoto .....	980,976	June 25	214	105	78	31	49.06	—
Kagoshima* .....	1,209,162	July —	—	—	—	—	—	—
Awamori* .....	462,865	" 4	2	1	—	1	—	—
TOTAL (imperfect, owing to absence of full returns from certain districts)	—	—	975	532	273	168	54.56	—

\* Returns incomplete.

## CHAPTER VII.

*The Epidemic of 1879.*

Notwithstanding that the extent of the visitation last considered was not sufficient in any part of the country to entitle it to the name of a disastrous epidemic, yet it lingered persistently in Osaka and other southern portions of the empire, which thus became the *foci* of the very grievous and widespread disease of this year. A glance at the table subjoined to this chapter will show that cholera made its appearance almost simultaneously, some time previous to the 20th April, in Yehime in Shikoku, Oita and Kagoshima in Kiushiu, and Hiroshima on the main island of Nippon. It manifested itself in Osaka and Hiogo two or three weeks later, and then followed irregular courses, generally tending northward, until by the beginning of October it had the whole of the empire in its deadly embrace. It will be interesting to trace the direction of the cholera waves by comparing the table with the outline map of Japan. For nearly two months the principal ravages were confined to the circle of the country indicated by the names of the ken or prefectures above mentioned. In Osaka at one time as many as a hundred and more deaths



occurred daily. The unusually long time during which the malady lingered in its first focus before spreading to other and distant parts of the country, together with anomalous symptoms showing slight deviations in a number of cases from the usual type of Asiatic cholera, caused some of the medical men of those parts to refuse for a time to bestow this title upon it. They attempted to show that it was a merely local affection, due to bad diet and neglect of hygienic measures, and called it *gastro-enteritis*. I will not now discuss at length the unsoundness of these peculiar views, as the subsequent widespread prevalence of the disease and the great mortality wrought by it have no doubt caused them to be long ago abandoned. It is to be regretted, however, that they should ever have been advanced,\* as they certainly misled the sanitary authorities in this vicinity and elsewhere, and in some cases caused a delay in the institution of precautionary measures against the introduction and circulation of infection, which thus gained a footing in many places where it might have been excluded. For myself I never for an instant doubted the choleraic nature of the disease, nor indeed that it was Asiatic cholera.

Notwithstanding the attempts already referred to, to prove the local nature of the disease, the authorities here were by no means convinced of the correctness of the theory; and on the 2nd June asked permission of the central government to institute inspection of vessels arriving from the localities where the disease prevailed. It is evident, however, that the government was still inclined to believe the statements made as to the local nature of the malady, as the request was not granted until some time afterwards. In the meantime, or on the 18th June, two steamers, the *Niigata Maru* and the *Hiroshima Maru*, both from the infected port of Hiogo, arrived; and, as was subsequently proved, brought the first cases of cholera to this place and the capital, under the following circumstances. A stoker from the *Niigata Maru*, on the evening of his arrival, was seized with cholera in a brothel, whence he was conveyed to the house of a friend in Kanagawa, where he remained for a short time before his case was known to the authorities. He was removed to the temporary hospital at Ota. The quarter of the town of Kanagawa where he stayed became one of the *foci* of the disease. It is a somewhat curious circumstance that a man then living in Yokohama, where as yet no instance of the complaint had declared itself, and who had passed the remainder of the night of the 18th June with the courtesan visited by the stoker, was seized with cholera at the end of 48 hours. Still more remarkable is the fact that the woman herself escaped infection, as did all the other inmates of the house where she resided.

The next case was a passenger by the *Hiroshima Maru*, a steamer of the same line, arriving also from Kobe, and on the same day. This man was seized with vomiting and purging before he left the vessel. After landing he went to a hotel in Benten dori, Yokohama. I found him in collapse the next morning, and sent him to the cholera hospital, where he died.

The next case was that of a man occupying a dwelling close to the closet used by the last-mentioned patient. The locality, one of the most favoured in the town as regards drainage and the general hygienic condition of the people, formed another radiating point for the disease in Yokohama.

\* A British Consul was principally responsible for the dissemination of the error. He wrote to his Minister to the effect that the disease in Kobe and Osaka was not Asiatic or malignant cholera, at the same time deprecating the quarantine measures proposed to be enforced against those places. He based his report upon information said to have been furnished by a foreign medical man at Kobe.

In consequence of the very prompt measures taken in regard to the cases referred to, and the appearance of no new cases for some days, I was strongly inclined to believe it possible that all danger from this source had been overcome. Accordingly, on the 2nd July I saw the Minister of the Interior, communicated to him the facts, and suggested the feasibility of reducing the danger of further importation of the disease to a minimum by substituting, for the simple inspection system which he had authorised, a detention for a number of days. To this he immediately consented, and gave orders accordingly. Two days afterwards, July 4th, following said order, I inspected and put the *Genkai Maru* into quarantine for 10 days (which was subsequently reduced to seven days). The reason for the plan adopted was—first, that the government had accepted the decision of a mixed commission, which it had convened the year before, as to the advantages of the detention over the inspection system, as a means of preventing the importation of the disease from foreign countries; second, that the effect of a detention of a number of days would be an immediate reduction of the amount of travel from the infected localities carried on almost exclusively by sea, and hence a reduction of the chances of further importation of the scourge. Even should this not be entirely successful, the rate of mortality shown in Osaka, a city not one-third the size of Tokio, was enough to suggest *the inestimable value of every additional day that the disease could be kept from reaching the capital, with its 800,000 souls*. I at the same time recommended a land quarantine at the two mountain passes, by which nine-tenths of all communication other than by sea was carried on between the southern (or infected) and the other portions of the empire. *In proof of the justifiableness of the above measures, not a single case of the disease entered by either the sea or land route after they were enforced.* Results so conclusively demonstrative of the efficacy of stringent measures can hardly fail to convince. In view of all the facts, I have no hesitation in affirming that had these measures been adopted before the arrival of the two steamers above mentioned, a very strong probability existed of an entire escape of this section of the empire from the scourge. As it was—as will be seen by the table annexed—the number of cases was very far less in proportion to those in other districts. However, the fact remains that, notwithstanding the energetic measures adopted in regard to the cases above mentioned as having been brought into Yokohama on the 18th, a foothold had been gained; and new cases began slowly to show themselves, radiating from the centres thus established, till the epidemic became general here and in the surrounding country.

It turned out unfortunately also that the passengers by the mail steamers who had furnished the earlier cases in this port had also brought the disease into the capital and formed a centre of infection there, as reported by Dr. DOENITZ at a meeting of the Tsukiji (Tokio) Board of Health. After distinctly asserting that “the present epidemic is infectious and Asiatic cholera,” he stated that it could be “traced back to and shown clearly to be connected with that of 1877.”

The history of it is this. Some months ago the graves of soldiers who died of cholera in 1877 were opened by the government, partly, it is said, for certain religious purposes, partly to bury more decently those who had been hastily interred during the war. The present disease began instantly from that point, spread slowly in Kiushiu, whence it was brought to Yokohama and Tokio by the *Hiroshima Maru*. Vigorous precautionary proceedings on the part of the government of these two places, however, kept the contagion within bounds for a time; and it was not till the end of August and early in September that the number

of new cases occurring daily began to attain the average of from 20 to 50 in each of the two localities (Yokohama and Tokio).

Having once gained a footing in these two places, it followed the usual course of the disease—being most severe in localities in bad hygienic conditions. The foreign town of Yokohama suffered but little, only two fatal cases occurring late in the season. It is a somewhat remarkable fact that the so-called Chinese town, where some 2,000 of this race are crowded in badly constructed dwellings, and abounding in filth, escaped the disease as in 1877, probably for the same reasons, viz., that their drinking water was drawn from a source of undoubted purity.

A central national health board had been permanently established in the capital, and was composed of foreign and native physicians. Its special scope was to provide for quarantine; and to aid its local branches throughout the empire.

Regarding the measures taken by the Yokohama local government, too much praise cannot be bestowed upon it. Much the same method of procedure was adopted as in 1877, based on acknowledged modern principles of sanitation. The permanent Sanitary Bureau, which was then added to the existing organization of the local government in this place, was now supplemented by an extraordinary board, with the governor or chief of the prefecture as chairman, and the heads of the other departments, police, financial, etc., as members; and a large staff of assistants. The experience of the epidemic of 1877, together with large appropriations from the central government, as on that occasion (a system adopted in regard to all the local boards throughout the empire, to meet the expenses of extraordinary measures), showed even more than previously that the Japanese are almost as capable of conducting operations of this class as any of the western nations. Having been asked to join the organization as before at the very first, no one knows better than I the readiness with which they seize upon everything ascertained and practised among enlightened nations, which can in any way secure to them the advantages of modern progress in sanitary as in all other matters. I may mention here that a great deal of credit is due to the action of the Governors of the various prefectures for their energy in combating the disease. These officers are, almost without exception, young men, selected for their ability or promise, many of them having spent more or less time in foreign countries. To this class belongs Mr. NOMURA YOSHUSHI, prefect of this district, to whose individual endeavour much of the success attending the rigorous sanitary scheme pursued in this vicinity is due. When the disease had fully established itself, he organized and presided over a more complete health board, of a temporary character, to which were attached, besides myself, three foreign medical men, Dr. GUTSCHOW, WHEELER, and GEERTS. Much valuable service was rendered by this body, especially in the matter of house-to-house inspection, and instituting measures for the purpose of effectually meeting the altogether possible reappearance of the scourge next year. A large and commodious hospital had already been erected and fitted out under my supervision, to be conducted on modern principles, for the reception of the indigent who could not be treated in their homes. The board further occupied itself in perfecting the arrangements already initiated in this establishment, and in detailing committees to visit the localities throughout the prefecture, which is one of large extent, where the disease was most severe, and enforcing measures for arrest or control of the epidemic.

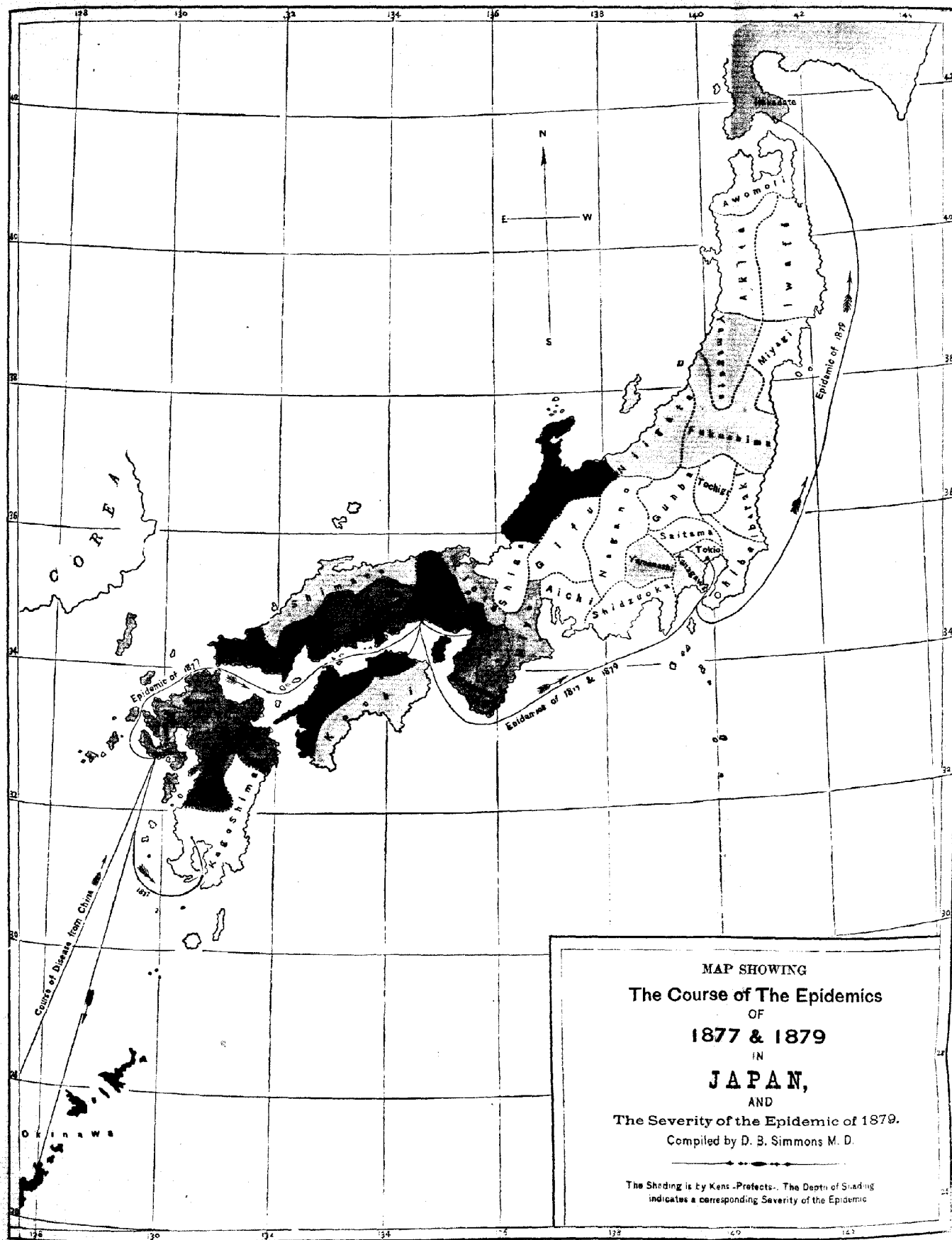


TABLE No. 3.—CHOLERA RETURNS, 1879 (to 20th December, inclusive).

FU OR KEN.	Population.	Returns commenced.	Patients.	Dead.	Cured.	Under Treatment.	Per cent of Mortality	Patients in 10,000 of Population.
Yehime.....	1,403,693	April 22	14,157	9,568	4,588	1	67.59	100.86
Oita.....	718,816	" 23	5,553	2,973	2,403	177	54.54	77.25
Hiroshima.....	1,197,835	" 23	6,414	4,443	1,818	153	69.27	53.55
Kagoshima.....	1,209,162	" 30	1,796	748	1,048	—	41.65	14.72
Yamaguchi.....	855,618	May 15	6,051	3,277	379	2,395	54.16	70.72
Fukuoka.....	1,070,244	" 21	4,830	3,087	1,659	84	63.91	45.13
Osaka.....	553,777	" 22	9,253	7,186	1,913	154	77.66	167.09
Okayama.....	784,621	" 22	9,096	5,194	3,410	492	57.10	92.38
Kumamoto.....	980,976	" 24	6,921	3,249	3,278	394	46.94	70.55
Shiga.....	721,099	" 25	890	601	277	12	67.38	12.34
Hioo.....	1,357,377	" 30	9,007	6,208	2,771	28	68.92	66.23
Wakayama.....	591,668	June 2	2,653	1,829	824	—	68.94	44.84
Kioto.....	798,897	" 6	1,411	1,118	239	54	79.23	17.66
Sakai.....	923,030	" 7	5,849	4,083	1,241	525	69.81	63.37
Kochi.....	1,164,723	" 7	4,556	2,068	94	2,394	45.39	39.12
Nagasaki.....	1,173,263	" 11	6,964	2,681	1,684	2,599	38.50	59.36
Miye.....	830,415	" 15	1,677	1,090	475	112	65.0	20.19
Tokio.....	881,421	" 19	2,241	1,662	432	147	74.16	25.46
Kanagawa.....	715,258	" 19	2,253	1,504	749	—	66.76	31.50
Shimane.....	1,023,678	" 19	3,462	2,231	1,223	8	64.44	33.82
Ishikawa.....	1,823,507	" 23	30,916	18,321	7,283	5,312	59.26	169.36
Shidzuoka.....	976,405	" 26	1,489	1,007	358	124	67.63	15.25
Yamanashi.....	381,229	" 26	1,065	455	591	19	42.72	27.94
Chiba.....	1,078,635	" 27	1,074	695	379	—	64.71	9.96
Ibaraki.....	875,491	" 29	579	305	227	47	52.68	6.61
Gifu.....	818,984	" 30	457	301	146	10	65.86	5.58
Aichi.....	1,267,206	July 2	2,556	1,375	549	132	66.88	16.22
Gumma.....	554,888	" 2	105	105	60	—	63.64	2.97
Saitama.....	912,528	" 26	686	303	275	48	52.92	7.52
Niigata.....	1,504,613	" 8	5,086	2,165	417	2,504	42.57	33.80
Okinawa.....	167,822	" 16	8,435	3,656	4,764	15	43.34	501.89
Nagano.....	973,959	" 27	525	146	—	379	27.81	5.39
Akita.....	613,389	August 3	1,015	592	195	228	58.33	16.47
Fukushima.....	765,115	" 4	1,666	1,104	439	123	66.27	21.50
Tochigi.....	543,245	" 6	797	436	361	—	54.71	14.48
Yamagata.....	657,613	" 8	1,596	780	209	507	48.87	24.08
Kaitaku.....	150,667	" 8	414	253	108	53	61.11	27.28
Awomori.....	462,865	" 9	741	349	62	330	47.10	15.04
Iwate.....	579,249	October 8	39	20	6	13	51.28	0.67
Miyagi.....	594,684	" 10	78	42	36	—	53.85	1.31
ARMY STATISTICS:—								
Hiroshima garrison.....	—	June 2	9	5	4	—	55.56	—
Osaka.....	—	" 17	92	32	60	—	34.78	—
Himeiji.....	—	" 27	10	4	6	—	40.0	—
Matsuyama.....	—	" 28	25	7	18	—	28.0	—
Kokura.....	—	" 29	29	14	15	—	48.28	—
Otsu.....	—	" 29	1	—	1	—	—	—
Marugame.....	—	July 2	7	2	5	—	28.57	—
Fushimi.....	—	" 6	2	1	1	—	50.0	—
Fukuoka.....	—	" 11	8	2	6	—	25.0	—
Kumamoto.....	—	" 11	83	35	48	—	42.17	—
Kanazawa.....	—	" 23	19	10	3	—	84.28	—
Nagoya.....	—	" 24	2	1	1	—	50.0	—
Yamaguchi.....	—	" 28	9	3	6	—	33.33	—
2d Reg't Imperial Foot Guards..	—	August 13	2	2	—	—	—	—
Shibata garrison.....	—	" 10	9	6	—	3	66.67	—
Artillery G'rds, Nagasaki Batt'y	—	" 24	1	1	—	—	—	—
Sakura garrison.....	—	" 23	1	1	—	—	—	—
Military Officers' School.....	—	" 31	3	—	3	—	—	—
Narawashino-hara.....	—	October 17	1	—	1	—	—	—
NAVY STATISTICS:—								
Yokohama.....	—	July 30	1	—	1	—	—	—
Yokosuka.....	—	" 30	32	12	8	12	37.50	—
Uraga.....	—	August 8	5	3	—	2	60.0	—
Shinagawa.....	—	" 21	5	3	2	—	60.0	—
Pest Hospital at Nagaura.....	—	" 22	5	2	3	—	40.0	—
TOTAL.....	—	—	164,274	97,422	47,162	19,590	59.30	47.40

## CHAPTER VIII.

*General Considerations on the Character of the Epidemic of 1879; Treatment, etc.*

Though the period of epidemic prevalence of cholera in Japan before the treaty ports were opened to foreigners is obscure, as already stated, my own residence in the country for the greater part of the time since that event enables me to speak with certainty in regard to all subsequent ones. Between the epidemics of 1861-2 and that of the last three years, no disease has appeared here resembling that widespread and fatal one. In this opinion I am supported by Dr. HEPBURN, who has been a resident for the same length of time as myself. Thus, I venture to assume as settled the question of the non-endemic nature of the disease, in opposition to the assertions to the contrary of those whose length of residence and opportunities for observation have been incomparably more limited than ours. The visitation of 1861-2 found this country in much the position of all others of the Orient as regards a knowledge of means for staying, in any way, epidemic ravages. The result was an immense destruction of life, of which only the vaguest account exists. This may be seen from the fact that the basis of the mortality rate in Tokio, the capital, was formed thus: a bridge on the principal thoroughfare was swept after each lot of 100 corpses had passed over it. I refer to this here to illustrate the immense progress which this country has made in these matters, as may be seen more markedly by the carefully prepared tables of the epidemics of 1877-8-9 printed with this paper. I am aware that the correctness of these may be questioned, in view of the limited experience of this people in such business. From my own knowledge of the painstaking manner in which these statistics are prepared, in connexion with the extraordinary attention given by the officials to detailed records of the minutest particulars in other matters, I am, however, disposed to consider them as correct as most others compiled under more favourable circumstances. The question of diagnosis by but imperfectly educated, or, more properly speaking, entirely uneducated, men in many cases, is raised as another objection to this view. I answer that cholera presents, as a rule, such unmistakeable symptoms that few among the more ignorant are unable to recognise it. In any case, errors of diagnosis find a fair offset in concealment—to avoid the observation of the sanitary police,—even when temperate repressive measures are resorted to. Though gained at a fearful cost, the experience acquired by the whole country in sanitary science during these three years of epidemic prevalence of cholera has been immense; such an impulse has also been given by the calamity to medical education as could hardly have been attained in any other way. The doctors of the Chinese school, who form eight-tenths of all the medical practitioners of the country, have been brought into contact with men sent from the various sanitary boards to their assistance, and who were well up in modern hygienic knowledge. The repressive measures initiated here, and always unavoidable when effective sanitation is attempted, were not unfrequently opposed by the ignorant masses. In most cases, however, they were peacefully overcome. This was due in a great degree to the liberality of the various local organizations in making reasonable compensation for losses sustained by those on whom the effect of the legislation unfortunately fell. The hospitals—those constructed in this section at least—were roomy, and the attendance was liberal and good. In some cases one of the family of the patients was permitted to accompany them to, and aid in their care at, the lazarets. At the one where I was in attendance, no

single instance of infection, traceable to this humane provision, occurred. The medicines, ice, and nourishment supplied were abundant and good. Cremation of those who had died from the disease was almost universal, a practice rendered comparatively easy from the fact that the people, in many cases of their own accord, adopt this method of disposing of their dead. The principal disinfectant used was carbolic acid. As this article is only obtained from Europe and America, advantage was taken by speculators, both native and foreign, of the great demand for it, so that the price per pound ranged from \$1 to as high as \$10. Notwithstanding this, there was little stint in its use in the large towns. In the rural districts, however, it was impossible to meet the demand. During the first year of the last epidemic prevalence of the disease (1877), I advised the use of a solution of sulphurous acid, so strongly recommended by LEBERT (ZIEMSEN'S *Encyclopædia*, American translation, vol. 1, p. 452) for the disinfection of vaults, privies, night-stools and vessels, which plan was adopted in this place, and to a certain extent in Tokio, with apparent good results. LEBERT closes his remarks on this disinfectant as follows:—

My experiments with it justify the hope that we may possess in it a potent, cheap, and easily applicable method of disinfection for a wide range of cases.

This is a most important consideration, in view of the fact above stated in regard to carbolic acid, which cannot be made here in any considerable quantity, in consequence of the very few gasworks in operation, while sulphurous acid can be manufactured both cheaply and abundantly. I am disposed, however, to think that too much importance is often attached to the value of disinfectants generally, for the reason that they are rarely used in sufficient quantities, especially where price is taken into account. The same amount of money expended in furnishing a good drinking water supply, isolation of the sick, and a proper disposition of the night-soil, would unquestionably prove more effective.

A large number of facts were gathered, showing, as usually observed, that the great routes of travel were the principal means of spreading the disease from one part of the country to another. That a contaminated drinking water supply was the immediate cause of an extended prevalence of the malady, in a number of large country towns especially, was demonstrated with great certainty. The places of this description which suffered most in this section of the empire were in nearly every case located at the foot of mountains, where the custom of directing streams of water through the streets was followed—this supply being too often used both for drinking and laundry purposes. A marked instance of contamination of wells by latrines was shown in the low-lying town of Hiramura in this prefecture. The disease had already attacked a large number of its inhabitants, and was daily increasing. A commission was sent by the local government, which closed all the wells, and had a supply of good water brought in boats for the use of the entire population, a measure which resulted in a complete disappearance of the disease in few days.

The very mild character of the epidemic of this year in this place (Yokohama) and the capital, compared with its fearful ravages in the southern cities of Osaka and Hiogo, appears somewhat remarkable. The first cases, it will be remembered, arrived here in the middle of June. Still its progress was very slow. I see no means of explaining this except by the severer sanitary measures enforced, due chiefly to the superior ability of the men composing the health boards.

here and in the capital and vicinity. In fact, some of the best talent which the country affords, both native and foreign, was called into requisition in this special service. The plan already referred to, that of supplying these and all other similar organizations with money from the treasury of the central government, appears a good one, relieving the prefectures of the burden, and thereby ensuring prompt action. A hint is here conveyed well worth the consideration of other countries.

As stated previously, a considerable difference of opinion existed among the earlier observers of the disease, as to its nature. It appears difficult to understand this, in view of all the circumstances attending the mortality and spread of the epidemic then present. It is quite evident that the testimony of facts was allowed little weight with many such persons. A certain number of individual symptoms, it was said, were wanting to make the prevailing disease Asiatic or malignant cholera. I myself saw many cases, both in town and the hospital, in which small bilious stools were present, instead of the so-called typical profuse rice-water discharges of malignant cholera. From what I could learn, it was on this ground that the "Thomases" based their unbelief as to the nature of the disease—notwithstanding distinct evidence of infection, a rapid, fatal collapse, suppression of urine, and a 50 to 75 per cent. mortality. That the habits and customs of a people, race, etc., may influence the type of many diseases is well known. That cholera in Japan should not be an exception to this possibility is evident. As among all the foreign medical men here, but two or three can be found who have now any doubt on this subject, it is unnecessary to pursue the discussion farther.

The treatment of the disease followed by those belonging to the modern, in distinction from the Chinese, school of medicine, has been that found in the more recent treatises on cholera. As the greatest severity of the epidemic showed itself at a distance from the centres of education, or in the western provinces, where a vast majority of the medical men still follow the Chinese system, but a small proportion of those attacked with the disease had the advantages of what would be called efficient medication. Still the mortality has but little exceeded the average of that in more enlightened countries. This certainly is not very flattering to our boasted healing art, founded on so much study and research in the treatment of disease. There can be no question as to the efficacy of sanitary measures, however, which furnishes a strong argument in favour of renewed and increasing efforts in perfecting this branch of science. In my own cases and those treated by my students who were detailed on special duty in the hospital of Yokohama, and for the instruction of medical men in the rural districts of this prefecture, opiates were but moderately used, except for the relief of the premonitory diarrhoea and pain or cramps in the abdomen and extremities—in the latter case hypodermically. Ice was freely given to quench the thirst. The vomiting sometimes yielded to from  $\frac{1}{4}$  to  $\frac{1}{2}$  grain of morphine, blown into the fauces or placed on the back of the tongue, when all other means had failed.

At the first appearance of the disease I determined to try the action of pilocarpine for the relief of uræmic symptoms, and also protochine where profuse diarrhoea was present, the latter medicine, I believe, having been first used by Professor BAELZ, of the Imperial College of Tokio. In regard to the former, I am convinced that it will be found on further trial to be a drug of considerable value in many cases of this malady. Its action on the kidneys especially, when used hypodermically, was often more pronounced than on the skin—partially, no doubt, on



account of the difficulty of keeping the patients covered up after its administration. In a number of cases I found, even after suppression had lasted for several hours, and symptoms of coma had set in, that the kidneys would commence to act profusely, so as to saturate the patient's clothes and bedding. This was followed by a relief of the stupor, and final recovery, when such a termination had been regarded as almost hopeless. I found that a certain amount of caution was necessary, however, in its use, as the first depressing effect of the remedy appeared in two or three cases to have diminished the chances of recovery, reaction not having been sufficiently established. The results of my trials of protozoine were less satisfactory. In two cases only did I find that it checked the diarrhoea; but in these its action was almost magical, very profuse rice-water stools entirely ceasing on the administration of two doses. If it has any real value, I am disposed to think it is only under such circumstances.

By a comparison of the weekly returns of the Central Sanitary Bureau, I find even at this late date (Dec. 24th) that the disease has by no means ceased its ravages in those sections where it has been most severe; though in this place and Tokio no new cases have been reported for several weeks. The outlook for another year is therefore by no means encouraging. Meanwhile, I understand that the Central Sanitary Bureau is busily engaged in preparing an elaborate report from information furnished by returns from all parts of the empire. When published it will, no doubt, add largely to our knowledge of details of the past visitation, and supply valuable experience for the guidance of all concerned in coping with the recurrence of any similar calamity.

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#### ON THE INFLUENCE OF THE HABITS AND CUSTOMS OF RACES ON THE EPIDEMIC PREVALENCE OF CHOLERA AMONG THEM.

So overwhelming is the evidence in support of the theory that cholera is propagated by means of the excreta or vomit of those suffering from the disease, that it would be a waste of time to reconsider the question here. In the same way it is superfluous to do more than take for granted that drinking water is by far the most common medium for the transport and dissemination of infection. The influence of the habits and customs of races and nations upon the greater or less degree of contamination of their water supply, however, and the consequent effect of rendering the mass of the people more or less liable to epidemics of the disease, are subjects which have not been so thoroughly studied. And yet the connexion is a very intimate one, as becomes apparent when we investigate comparatively the habits and modes of life of the inhabitants of three widely distinct nations of Asia which have of late years become much more accessible than they used to be to medical observers from the schools of the western world. The first point which presents itself is the source of the water supply; the second, the disposition of the night-soil.

The sources of drinking water are—(1) artificial, namely aqueducts, wells, or tanks; and (2) natural, namely springs and streams or rivers. Whenever the nature of the soil will permit it, wells are by far the most common sources in the rural districts and smaller towns in all parts of the world, except in the mountain regions, where streams are turned into the streets, and serve

the double purpose of drainage, and of supplying the water used for washing, if not, by the less scrupulous, for drinking purposes also. As the facts which I have recorded have been especially drawn from India, China, and Japan, I will here briefly refer to the principal peculiarities prevailing on these points in each of the three countries.

INDIA.—Though the habits and customs of the native races of India have often been cited in connexion with the present subject for the purpose of comparing them with those of other people, yet I will venture to restate them briefly here.

1. *Drinking Water Supply*.—This is derived from (a) wells, (b) so-called “tanks” or artificial ponds, (c) the watercourses of the country.

(a) The *wells* generally resemble those in other parts of Asia.

(b) The *tanks* are excavations, often of considerable extent, made for the purpose of collecting the surface water during the rainy season and storing it up for the dry. Necessarily they are mere stagnant pools. The water is used not only to quench thirst, but is said to be drunk as a sacred duty. At the same time the reservoir serves as a large washing tub for clothes, no matter how dirty or in what way soiled, and for personal bathing and ablution.

(c) The *watercourses*.—Many of these are sacred; notably the Ganges, a river 1,600 miles long, in whose waters it is a religious duty for millions, not only of those living near its banks, but of pilgrims, to bathe and to cast their dead.

2. *Disposal of the Night-soil*.—The Hindu cannot be made to use a latrine.\* In the cities he digs a hole in his habitation; in the country he seeks the fields, the hill sides, the banks of streams or rivers, when obliged to obey the calls of nature. Hence it is that the vicinity of towns and the banks of the tanks and watercourses are reeking with filth of the worst description, which is of necessity washed into the public water supply with every rainfall. Add to this the misery of pilgrims, their poverty and disease, and their terrible crowding into the numerous towns which contain some temple or shrine the object of their devotion, and we can see how India has become and remains the hot-bed of cholera epidemic. In the United States official report on this disease (pp. 683 *et seq.*), the horrors incident upon the pilgrimages are detailed with appalling minuteness. W. W. HUNTER, in his *Orissa*, states that 24 high festivals take place annually at Juggernaut. At one of them, about Easter, 40,000 persons indulge in hemp and hashish to a shocking degree. For weeks before the “car festival” in June or July pilgrims come trooping in by thousands every day. They are fed by the temple cooks to the number of 90,000. Over 100,000 men and women, many of them unaccustomed to work or exposure, tug and strain at the car till they drop exhausted and block the road with their bodies. During every month of the year a stream of devotees flows along the great Orissa

\* The customs of the Hindus are very peculiar in some respects. It is calculated that 150,000,000 of them always defæcate on the ground. They have no privies or latrines, and even the native soldiers under British rule will not use them. A mutiny greater than that of 1857 might be produced if this necessary hygienic rule were enforced. Many thousands of tons of human excrement have thus been deposited upon the open ground for some thousands of years. Outside the large cities of India, the bulk of the people always dwell in villages of from 2,000 to 10,000 inhabitants, and from 5 to less than 20 miles apart. The result has been the accumulation of enormous amounts of faecal matter, with a corresponding degree of saturation of the soil, and the consequent extensive pollution of water in every direction.—*Cholera Epidemic of 1873 in United States*, p. 685.

road from Calcutta, and every village for 300 miles has its pilgrim encampments. The people travel in small bands, which at the time of the great feasts actually touch each other. Five-sixths of the whole are females, and 95 per cent. travel on foot, many of them marching hundreds and even thousands of miles, a contingent having been drummed up from every town or village in India by one or other of the 3,000 emissaries of the temple, who scour the country in all directions in search of dupes. When those pilgrims who have not died on the road arrive at their journey's end, emaciated, with feet bound up in rags and plastered with blood and dirt, they rush into the sacred tanks or the sea, and emerge to dress in clean garments. Disease and death make havoc with them during their stay; corpses are buried in holes scooped in the sands, and the hillocks are covered with bones and skulls washed from their shallow graves by the tropical rains. The temple kitchen has the monopoly of cooking for the multitude, and provides food, which, if fresh, is not unwholesome. Unhappily, it is presented before Juggernaut, so becoming too sacred for the minutest portion to be thrown away. Under the influence of the heat it soon undergoes putrefactive fermentation, and in 48 hours much of it is a loathsome mass unfit for human food. Yet it forms the chief sustenance of the pilgrims, and is the sole nourishment of thousands of beggars. Some one eats it to the very last grain. Injurious to the robust, it is deadly to the weak and wayworn, at least half of whom reach the place suffering under some form of bowel complaint. Badly as they are fed, the poor wretches are worse lodged. Those who have the temporary shelter of four walls are housed in hovels built upon mud platforms about four feet high, in the centre of each of which is the hole which receives the ordure of the household, and round which the inmates eat and sleep. The platforms are covered with small cells without any windows or other apertures for ventilation, and in these caves the pilgrims are packed, in a country where, during seven months out of the twelve, the thermometer marks from 85° to 105° F. HUNTER says that the scenes of agony and suffocation enacted in these hideous dens baffle description. In some of the best of them, 13 feet long by 10 broad and 6½ high, as many as 80 persons pass the night. It is not, then, surprising to learn that the stench is overpowering and the heat like that of an oven. Of 300,000 who visit Juggernaut in one season, 90,000 are often packed together for a week in 5,000 of these lodgings. In certain seasons, however, the devotees can and do sleep in the open air, camping out in regiments and battalions, covered only with the same meagre cotton garment that clothes them by day. The heavy dews are unhealthy enough; but the great festival falls at the beginning of the rains, when the water tumbles in solid sheets. Then lanes and alleys are converted into torrents or stinking canals, and the pilgrims are driven into the vile tenements. Cholera *invariably* breaks out. Living and dead are huddled together, under a leaking roof, above a reeking cesspool, and with no more space to lie on than they can cover. In the numerous so-called corpse fields around the town as many as 40 or 50 bodies are seen at a time, and vultures sit and dogs lounge lazily about gorged with human flesh. In fact, there is no end to the recurrence of incidents of misery and humiliation, the horrors of which, says the Bishop of Calcutta, are unutterable; but which are eclipsed by those of the return journey. Plundered by priests, fleeced by landlords, the surviving victims reel homeward, staggering under their burdens of putrid holy food wrapped up in dirty cloths, or packed in heavy baskets or earthenware jars. Every stream is flooded; and the travellers have often to sit for days in the rain on the bank of

a river before a boat will venture to cross. At all these points the corpses lie thickly strewn around—an English traveller counted 40 close to one ferry,—which accounts for the prevalence of cholera on the banks of brooks, streams and rivers. Some poor creatures drop and die by the way; others crowd into the villages and halting places on the road, where those who gain admittance cram the lodging places to overflowing, and thousands pass the night in the streets, and find no cover from the drenching storms. Groups are huddled under the trees; long lines are stretched among the carts and bullocks on the roadside, their hair saturated with the mud on which they lie; hundreds sit on the wet grass, not daring to lie down, and rocking themselves to a monotonous chant through the long hours of the dreary night. It is impossible to compute the slaughter of this one pilgrimage. Bishop WILSON estimates it at not less than 50,000. And this description might be used for all the great Indian pilgrimages, of which there are probably a dozen annually, to say nothing of the hundreds of smaller shrines scattered through the peninsula, each of which attracts its minor hordes of credulous votaries. So that cholera has abundant opportunities for spreading over the whole of Hindustan every year by many huge armies of filthy pilgrims; and the country itself well deserves the reputation it universally possesses of being the birthplace and settled home of the malady.

CHINA.—In spite of the proximity of this vast empire to India, and the fact that it is of much greater extent and twice as populous, we find that cholera, comparatively, is rarely epidemic there.

1. *Drinking Water Supply*.—This is derived from (a) wells, and (b) springs and natural streams. Now, though the wells and springs are used in China for drinking purposes to much the same extent and in much the same manner as in India, yet the rivers and lakes are not drunk from as part of a religious duty, nor is bathing in them a sacred rite. The absence of pilgrimages contributes to keep the water supply comparatively uncontaminated.

2. *Disposal of the Night-soil*.—Human manure is valuable, and hoarded for fertilising purposes. Hence the excreta are deposited by the individual in a receptacle made for the express purpose, and from motives of economy kept in a fairly good condition of repair. Even in cities and large towns latrines are not employed. Special wooden boxes are among the first necessities of bedroom furniture, and form part of every bridal outfit. The contents are daily emptied into earthen jars or wooden tubs placed in the courtyard of the house, whence they are in due course removed by the scavenger either direct to the fields, or to boats destined to convey them to a distance. Thus the greatest amount of security attainable is provided against the contamination of the water supply from this source. A still more potent preventive of infection is to be found in the fact that the Chinese will always, if possible, boil water before drinking it, if even they are unable to make it into some kind of tea. Here it is easy to see in the contrast presented between the customs of the Hindu on the one hand and the Chinese on the other, how in the one case every possible facility is provided for the propagation of infection; in the other, how the danger of contamination is reduced to a minimum.

JAPAN.—1. *Water Supply*.—The sources whence this is derived are generally of the same kind as those relied upon in China.

2. *Disposal of the Night-soil*.—The destination of the excreta is practically the same as in China. It is of value to the agriculturist, who employs it to fertilise his fields. An important

difference exists, however, in the manner of disposing of it before it comes into his possession. The Japanese invariably use latrines. These generally consist of oil-tubs set in the ground, either in the house or its immediate neighbourhood. Leakage or overflow may produce contamination of the water supply. In effect, notwithstanding the insular position of Japan and its remoteness from the home of the disease, as compared with China, it appears that in modern times the former country has suffered at least as frequently and severely as the latter from the ravages of epidemic cholera. The explanation is discoverable in the use of the latrine embedded in the earth in the one; the box and above-ground receptacle in the other.

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NOTE ON THE DRINKING WATER SUPPLY AND DISPOSAL OF THE NIGHT-SOIL AMONG  
WESTERN OR CIVILISED NATIONS.

As is well known, the water supply is derived (1), and most frequently, from wells; (2) from streams, lakes, and other natural collections of water; (3) from aqueducts bringing water from distant sources to cities and large towns. In this respect, then, the West does not display any striking difference from the East, except perhaps in the more extended and careful use of conduits.

*Disposal of the Night-soil.*—In this respect, however, the customs of the West approach more nearly to those of India than of China and Japan. In other words, the matter is not used as a fertiliser; but, as far as the great agglomerations of inhabitants in large cities are concerned, every conceivable means is taken to favour its discharge into the lakes or streams on whose banks the towns are generally situated, and whence, in case the water from proximity to the sea is not too salt for the purpose, the supply of drinking water is largely drawn by the people. Secondly, the latrine system in use in all the rural districts, as well as in many large inland cities, consists of closets, the receptacles being deep pits sunk in the ground, often without any special means for preventing the contents from filtering through the soil,—in fact, even favouring the disappearance of the liquid portion in this manner, thus rendering the trouble of emptying them less frequent. In districts where economy of space is of comparatively little importance, the latrines are located at the greatest convenient distance from the wells on the various compounds, though but little regard is had to the “run” of the land as regards drainage, or its inclination in a given direction. In densely populated localities, however, where only a few square feet of ground can be devoted to the “back yard,” the privy is often found within a few steps of the well. Hence, with our present knowledge of the possibility of direct contamination of wells in certain soils, even when situated at a considerable distance from the source of filth infection, no lengthy argument is needed to prove that the Chinese, as a nation, run far less risk of widespread epidemic disease, propagated through the water supply, than do the civilised nations of western lands. It is, comparatively, only a few years ago that even New York and other great cities of the modern world began to be supplied with water by aqueducts from pure and distant sources, instead of from back-yard wells, and caused the excrements of the population to be conducted into sewers, instead of being collected in pit latrines. The effect of the old plan may be seen in the terrible havoc wrought by cholera in New York in 1832, before the citizens were roused to the ancestral folly which they were perpetuating. So it may be said of London during the earlier visitations of the

disease, whose rapid dissemination was favoured by the then barely dreamt of action of the privy system upon the water supply. Since the development of the scheme of aqueducts and the improvement in sewage arrangements, no such destruction as was before frequent has occurred in the large centres where they have been introduced, although the seeds of infection have frequently been imported thither. Thus, still pursuing the theory that when the germs of cholera are present in any given geographical locality the disease is epidemic and severe, exactly according as the habits and customs of the people tend to the contamination of the drinking water supply, we meet no difficulty in accounting for the greater frequency of cholera epidemics in one country than in another, which at first sight might appear to be less exposed to its ravages. China furnishes an example of comparative immunity, remarkable when we take into account only those first impressions, derived from the crowded condition of her numerous vast cities, the disgustingly dirty habits of her people, and their ignorance of the most simple hygienic rules.

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#### THE ATMOSPHERE AS A VEHICLE FOR THE DISSEMINATION OF CHOLERA GERMS.

We come now to the consideration of the manner in which the air may possibly become a medium for the conveyance of cholera germs and the consequent spread of the disease. This can only be in two ways, namely, (1) by moist heavy vapour from infected sewers and cellars, or by inhalation during the process of washing clothing soiled by choleraic discharges; and (2) in the form of dust rising from the dried evacuations of cholera patients. There appears to be abundant evidence that under favourable circumstances the malady may be propagated by each of these means. Much difference of opinion exists, however, as to the extent to which germ-laden dust can be regarded as an agent of any potency in disseminating cholera; those most inclined to the affirmative opinion being observers in India. Among the practitioners of that country it is that the greatest number of advocates of the "miasmatic" doctrine of cholera is found, in opposition to the "contagionists," who believe in infection by germs derived only from the evacuations of those afflicted with the scourge. It is there, too, that we find exponents of the theory that drinking water plays but an unimportant part in the work of propagation, thus opposing themselves to the opinions of almost all observers in other parts of the world. With reference to the "dust infection" theory, we opine that in view of the facts already cited in connexion with the extensive deposit of the excretions of the population on the surface of the soil, there is sufficient reason to justify it. The air of Hindustan, especially during dry seasons, may well be poisoned by the germs it takes up and wafts hither and thither with the breeze. And here we can see how the question which we have raised as to the influence of the habits and customs of different nations upon their greater or less liability to the inroads of epidemic disease may help to explain the difference of opinion on certain points obtaining between observers in the Indian peninsula and those in western countries. Whereas in the latter places surface exposure can hardly be said to exist, the night-soil being collected in vaults and pits, or washed immediately into sewers and waterways, in India it is practically universal; and the poison which the excreta contain may effectually impregnate its victims by means of two vehicles of propagation, namely, water and air. In western regions its medium is water only.

Hence the divided opinion as to the source or cause of the disease among observers in the one case; their unity of belief in the other.

As we have seen, while the habits and customs of the three eastern nations which we have glanced at are distinctly opposite in the primary deposit of the night-soil, yet ultimately the substance is in each case destined to the same fate—that of exposure on the surface of the soil. Is this practice, then, it may be asked, not as much a cause of spread of the epidemic in China and Japan as in India, by dust as well as by contamination of the water after the filth has been so disposed of? A negative answer to this question may be promptly returned, and upheld by a very tenable hypothesis, to establish which we must briefly consider at what period of their existence the cholera germs are noxious. The question whether they are capable of producing infection at the moment of passing from an individual suffering from the disease, or whether a certain process of fermentation is necessary, has been often raised by investigators. That a certain amount of fermentation at least favours their development and increase is undoubted; but it is equally certain that the natural history of the protomycetes teaches us that their exuberant growth may be brought to an end, even when at the height of their destructive activity, by the development of other and harmless parasites (LEBERT in ZIEMSEN'S *Encyclopædia*, vol. I, p. 371). Now, in India the excreta are deposited direct from the body on to the soil, not in masses but in separate spots; thence they are either quickly washed into water supplies or dried in the sun. In either case the germs are carried hither and thither rapidly and in great number, with their infectious principles latent or in a greater or less condition of development. In China and Japan the night-soil is first lodged in various kinds of receptacles. When favoured by confinement in considerable masses it produces fermentation in various degrees, some of which tend to the development of other besides the choleraic parasitic growths. The longer and more complete the fermentation the greater then the chance of the destruction of the infectious germs by parasites innocuous to the human system, which thus render the whole mass harmless as a means of propagating the disease, even though particles may be taken up by air or water and broadly disseminated. Considering that, almost without exception, the manure is stored for a considerable time\* before use by the farmer, and that in the receptacles the cholera-infected stools must, in the vast majority of cases, be but a small portion of the whole, it is easy to see how the harmless products of the entire fermentation will quickly gain the mastery over the specific ones of the cholera stools. Thus we arrive at an apparent solution of the question why the night-soil, spread on the fields of China and Japan as a fertiliser, does not possess infectious qualities, even though originally mixed with matter containing cholera germs; and why in India the infected stools are, through their early deposition on the soil, active agents in the propagation of the pestilence. My repeated testings of the liquid manure in the vats of the peasants, while undergoing this preparation for use, during the hot season, have shown a slight acid reaction. Should this experience be borne out by further observation, we should find still another explanation of this supposed destruction of the cholera germs, as the power of acids to arrest their development, if not to destroy them altogether, is thoroughly recognized.

\* In Japan the manure is sometimes allowed to remain for weeks or months in the oil-tubs or rocky vats prepared by the agriculturists for its preservation. In no case is it spread on the fields until it has been kept for a period of 8 or 10 days, to allow it to "rot," as the local phrase goes; in other words, to ferment to such an extent as experience shows will best fit it for field purposes.

Hence it may be assumed that cholera evacuations are dangerous in proportion to their freshness or the limited amount of fermentation to which they have been subjected.\* This position may be strengthened by further evidence, negative, it is true, but not without much value. If the theory were ill founded, the manifestations of the disease would be as extensive and severe in the rural districts as in the large cities. This, however, has not been the case, as I have special reasons to know from my own experience of the epidemics of the last few years. In all the towns and villages of this section of the country where cholera has declared itself, it has been in nearly every case directly traceable to a contaminated water supply. Numerous instances have occurred wherein the soiled clothes of a cholera patient having been washed in a stream passing through hamlets or villages, the first succeeding visitations were all *below* that point. Sometimes such cases were the only ones which followed. I may remark in passing that the devastation has been much less considerable in the plains than at the foot of mountains or in valleys, where the water supply has been derived from brooks which are led through the streets, and so are liable to contamination by leakage from closets or the practice of washing garments in them. In the village of Hiramura, situated at a very low level, the malady raged for a short time with great virulence. The government closed all the wells, cleansed and disinfected the closets, and brought a pure supply of water from a distance. In a very few days afterwards the disease had disappeared altogether from the place.

Taking into consideration the geographical positions of China and Japan, the one touching, through her tributaries, the confines of the very hearth of the disease, the other enjoying all the advantages which insularity confers, we thus find that the latter country has relatively been more frequently and severely visited than the former. This is to be explained solely by the fact that a very bad latrine system, one which permits overflow, leakage, and filtration, and consequent contamination of wells, obtains in Japan, a condition of things which does not prevail in China, a country whose hygienic condition in other respects is far in arrear of that of her neighbour. The fact is of no inconsiderable significance, as the method of keeping and applying the night-soil as a fertiliser to the earth is identical in the two countries.

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\* The same may be said of typhoid fever, a complaint comparatively rare in China. It, also, is a disease of germ origin in the intestinal canal, and bears very close relation to cholera in its mode of contagion and propagation.



A.—Additional Notes on *Filaria Sanguinis Hominis* and Filaria Disease.\*

By PATRICK MANSON, M.D.

THE parasitic theory of the causation of elephantiasis has been subjected during the past eighteen months to a considerable amount of criticism, favourable and unfavourable. It has been accepted by some, and those the best acquainted with tropical disease, as supplying the key to what before was mysterious and a sealed book; others, again, suspend judgment in the matter, considering the evidence not yet complete; while a third section, including eminent pathologists, deny it altogether.

The late Dr. TILBURY FOX, in a clinical lecture on Elephantiasis Arabum, published in the *Medical Times and Gazette* for 12th October 1878, spoke as follows:—"The idea that filariæ are the cause of elephantiasis has arisen thus: filariæ have been found in the lymph and blood in cases of enlargement of the scrotum, with exudation of chyle-like fluid (chyloderma). They have also been detected in cases of elephantiasis in connexion with the so-called 'lymph scrotum'; and it has been assumed that as filariæ cause the lymphatic varix in the one, they must do so in the other form of scrotal and in leg enlargement, in which chyloderma, or chyluria, is absent; and it is assumed that the chylous and non-chylous enlargements are the same. But facts at present seem to indicate that filariæ have not been found in uncomplicated elephantiasis—that is, in disease without chylous exudation; and secondly, that filariæ occur only in connexion with chyluria (chylous abscess as shown by Dr. BANCROFT especially) and its associated condition, the escape of chyle from the skin, chyloderma. Filariæ, therefore, are the cause of the conditions associated with chyluria and chyloderma, and not of elephantiasis; but the former may complicate the latter. As Dr. FARQUHAR and I have elsewhere stated, 'They who affirm that the cause of ordinary elephantiasis of the scrotum is connected with the development of filariæ in the lymphatics, appear to forget that the results of lymphatic obstruction induced by different causes—for example, elephantoid inflammation and inflammations due to filariæ—must bear a close resemblance one to the other. There must be varicosity of the vessels and general enlargement of the tissues in the two cases; and this similarity is very likely to be misinterpreted into identity.'

"It must be allowed also that the fact that filariæ are often found, and have existed for some time, in the blood and urine of patients who exhibit no symptoms or signs of elephantiasis, is a strong argument against their presence being the real cause of the latter disease. The concurrence of filarious blood (filarious abscess) and elephantiasis in the same subject is not surprising when it is recollected that these things are co-endemic and common in the regions where they are chiefly observed; and what, therefore, at first sight seem to be cause and effect may often all be best explained—seeing that there is no necessary connexion between the two—as a concomitance. It has yet to be proved that 'true lymph scrotum' (varix lymphaticus) and true elephantiasis are identical diseases."

\* See Customs *Medical Reports*, xiii, 30; xiv, 1.

These words of Dr. TILBURY FOX, though they do not by any means give all the arguments *for*, yet state concisely most of the objections advanced *against*, the theory I have advocated. He admits, what it is impossible to deny, that lymph scrotum and chyluria depend on filariæ. He also admits that lymph scrotum and elephantiasis are sometimes found together, but he says this latter is coincidence merely, and therefore not sufficient for us to conclude they are really the same disease having the same cause. Now, in answer to this I would say that such a coincidence happening once or twice in a thousand cases could certainly not be considered a strong argument for the identity of the diseases; but when it happens very frequently, its significance becomes of a very different character, and amounts to nearly mathematical proof. Say that in a village of 500 inhabitants there is a case of elephantiasis and another of lymph scrotum; if these two diseases are quite independent of each other, the chances are 500 to 1 that in this particular instance we shall not find them combined in the same individual—this is the mathematical limit of the coincidence. But in fact the coincidence is a common one, and a frequent coincidence has a very different meaning from a rare one.

It must of course be at once admitted that lymphatic diseases the result of obstruction must all of them have a number of features in common, no matter what the cause of the obstruction may be. If lymph scrotum and elephantiasis had no features in common, they certainly could not be identical diseases; their having features in common is a necessary part in any argument to prove their identity, but of course only *part* of the proof, and has not been advanced as anything more than this.

Again, to say that because there are many who have filariæ in their blood without having elephantiasis, therefore filariæ are not the cause of elephantiasis, is not correct reasoning. Filariæ are admittedly the cause of chyluria and lymph scrotum, varicose glands, etc.; but yet we do not find these diseases in everyone who has hæmatozoa. We do not find that everyone who has atheroma in his arteries has an aneurism as well, or that everyone who gets rheumatic fever has heart disease, or that everyone who drinks spirits has a cirrhotic liver. These secondary effects of recognised causes are not necessarily always consequences—the cause may exist, though from some factor being absent the recognised consequence may not follow. These diseases are accidents—characteristic accidents; and so with filaria sanguinis hominis—chyluria, lymph scrotum, varicose glands, and elephantiasis are the result of the presence of the parasite in the body, but by no means the necessary consequences.

Dr. TILBURY FOX says that lymph scrotum and elephantiasis have yet to be proved to be identical diseases. I do not know what proofs could be adduced stronger than those I have already brought forward in these reports. In the cases I have detailed are instances of elephantiasis supervening on lymph scrotum and of the diseases co-existing. I would refer to Cases 10, 15, 20, and 21 of the lymph scrotum series, and to Cases 1, 17, and 25 of the hæmatozoa series. In addition to these, I would refer to several of the cases appended to this report.

It is true, however, that although tropical elephantiasis may be considered one of the effects of the filaria sanguinis hominis, yet we do not find the parasite in the blood in many well-marked cases of the disease. This is by far the strongest argument against the parasitic theory, and demands an explanation. It is certainly not an argument fatal to the theory, for analogous facts are common enough in pathology. Once started, a varix of any sort tends to

increase, though the application of the primary cause of the dilatation may have been but momentary.

After reading these and similar criticisms, and being still strongly convinced in my own mind by arguments and facts such as others and myself had adduced of the truth of the parasitic theory of elephantiasis, I determined to search for further and, if possible, still more convincing evidence. It seemed to me that such evidence might be found in that group of cases which belong strictly neither to pure elephantiasis nor to pure lymph scrotum, but are either a combination of these diseases or the transitional stage of one passing into the other. In about nine months I succeeded in finding six such cases; the notes of all of these are given *in extenso* at the end of this paper.

There is one feature which they all have in common—the enlargement of the groin glands; and directing my attention to this fact, I thought I might get some information as to the cause of this enlargement and the associated diseases by an examination of the contents of the glands. Accordingly, I introduced the needle of a hypodermic syringe into one of the varicose groin glands of a well-marked case, and drew off by means of the syringe an abundant supply of clear lymph. I found abundance of filariæ in this, though I could get none in the blood from the finger. The case was one of lymph scrotum passing into elephantiasis. The filaria embryos are described in my notes as being “very languid in their movements, one at least shrivelled, the lash at the head standing out very distinctly when seen with a low power even”; in other words, the embryos had the appearance of being old and moribund, as if they had lived for a very long time where I found them.

I would here observe, for the information of those who would repeat this experiment, that the operation of tapping the lymphatic glands is not, as far as my experience goes, attended with any danger. I have done it many times, and often many times in the same gland or the same patient. Within a few seconds of the withdrawal of the needle, the glands swell suddenly, but by next day all disturbance subsides. Bleeding or profuse escape of lymph are easily controlled by pressure with the finger. When the glands are very varicose, great abundance of lymph may be easily obtained, either by suction with the syringe or by simply allowing the fluid to percolate through the needle into a glass, the syringe being laid aside altogether. In this way I have many times abstracted several ounces through one puncture at a sitting. When the glands are more solidified, as in advanced elephantiasis, there may frequently be some difficulty in procuring a specimen of lymph; but if the needle is carefully and precisely introduced, and the glands then firmly squeezed between the fingers, the barrel of the needle on withdrawal is found as a rule to be full of lymph, and enough for a microscopic examination, at all events, can be blown out on a glass slide. Occasionally, in such a case, immediately following the withdrawal of the needle, a droplet of clear lymph appears at the puncture, and if one is prepared with a slide, may be secured before any sanguineous admixture takes place. When the lymph is very abundant, large numbers of filariæ may be found by collecting in a conical glass an ounce or two of the fluid, and waiting till the coagulum which presently forms has dissolved, and a dark brown sediment of corpuscles collected at the bottom of the glass. This process of coagulation and solution usually takes from 24 to 36 hours. In the sediment living filariæ are always very abundant and can be found readily. Of course in employing the needle of the hypodermic syringe in this way one

must be sure of the diagnosis, and that there is no hernia, and also regard must be had for the femoral artery and the large veins in the neighbourhood; but with a little caution and skill no danger need be apprehended.

The second case in which I employed the hypodermic syringe in this way was one of lymph scrotum with a peculiar elephantoid thickening of the integuments on the inner surface of the left thigh. In this case, also, though languid filariæ were found in the lymph from both groins, yet none were found in the blood. However, it is quite possible that both in this and the previous case the filariæ were overlooked in the blood, as the examinations may have been made when the embryos are normally absent from the circulation. I have no record of the hour at which the examinations took place, a most important omission, as I shall hereafter show, in determining whether a given patient's blood is filarious or not.

I now found that every case of lymph scrotum examined in this way yielded a similar result. A third case of elephantiasis and lymph scrotum presented itself for operation. In him the parasites were found in the blood, in lymph from the groin glands, and in lymph from the scrotum. The scrotum was removed, but two months afterwards filariæ embryos were still daily found in abundance in the blood. The scrotum after removal had all the characteristics of true elephantiasis.

The next case (Plate III, p. 48) I examined is one of great interest. The patient has been subject for years to elephantoid fever and inflammation of one leg. The scrotum is perfectly healthy. The leg has gradually enlarged at the foot, the knee, and the thigh, but at the calf—the site generally of the greatest swelling in elephantiasis—there has been comparatively little enlargement, the lymph which might have gone to build this up escaping as a copious discharge from the surface. On the side of the disease the groin glands are half indurated, half varicose, but on the opposite side they are all enormously swollen, and, as far as one can feel, all of them are varicose. These glands on both sides yield an abundance of lymph containing rather a scanty supply of filariæ, but I have not found in the blood from the finger one specimen, although it has been examined in great quantity very frequently and at suitable times. This combination of phenomena I would direct attention to:—first, elephantiasis; second, discharge of lymph; third, partial induration of lymphatics on the affected side; fourth, varicosity of lymphatics on the opposite side; fifth, filariæ in the lymph; sixth, total absence of filariæ from the blood.

The next case is also one of much importance, for it proves several things: first, that *filaria Bancrofti* is oviparous; second, that the parent worm lives somewhere in the lymphatic vessels, either in the glands or in the vessels on the *distal* side of the glands; third, that the ova are probably arrested and hatched in the first lymphatic gland to which the stream of lymph carries them. The patient applied on account of an elephanto-œdematous state of his legs. I could not pronounce it the œdema of anemia, it was too brawny for that, nor elephantiasis, as it pitted too readily. His urine and heart were healthy, but I was so struck with the swelling of the groin glands on both sides and the history of transient fever, that on finding a gland rather less indurated than the others I pushed a hollow needle into it and got out a drop or two of clear watery lymph. In this I found one free *filaria* embryo and *eleven ova*. Most of the ova contained living and moving embryos, about the identity of which there could not be the slightest doubt. The ova were oval, the extremities of their long diameter of rather too acute a curve

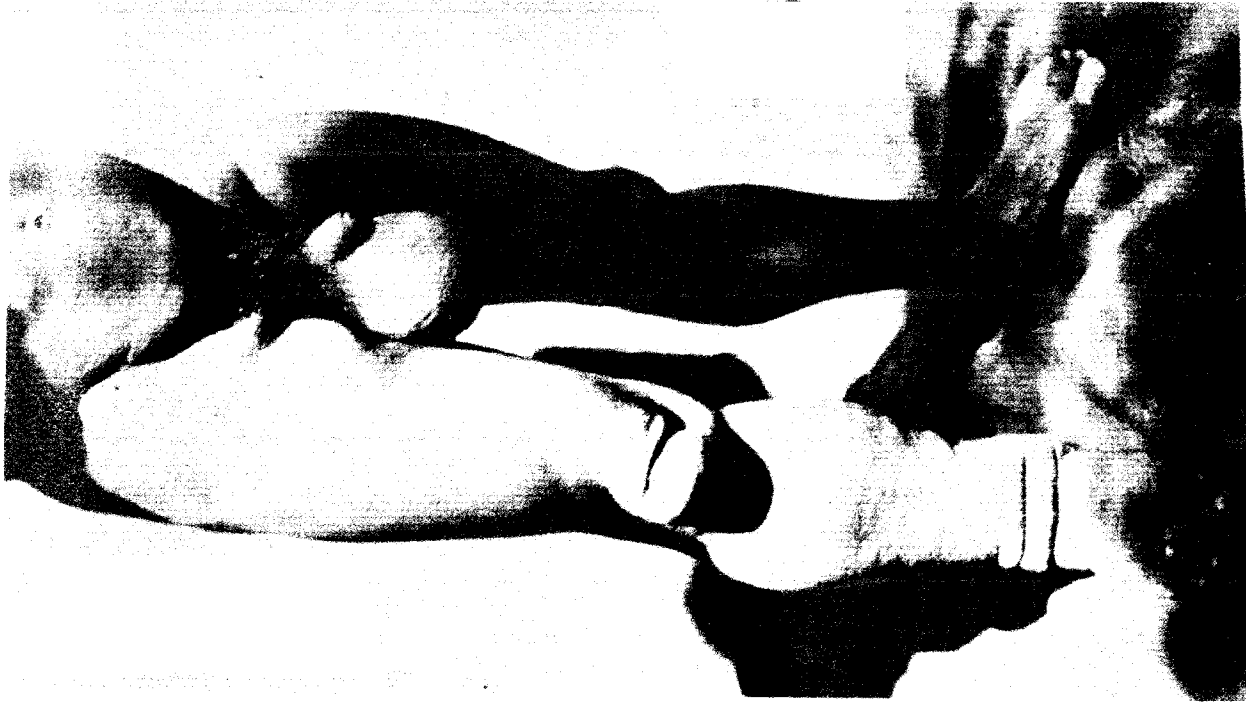
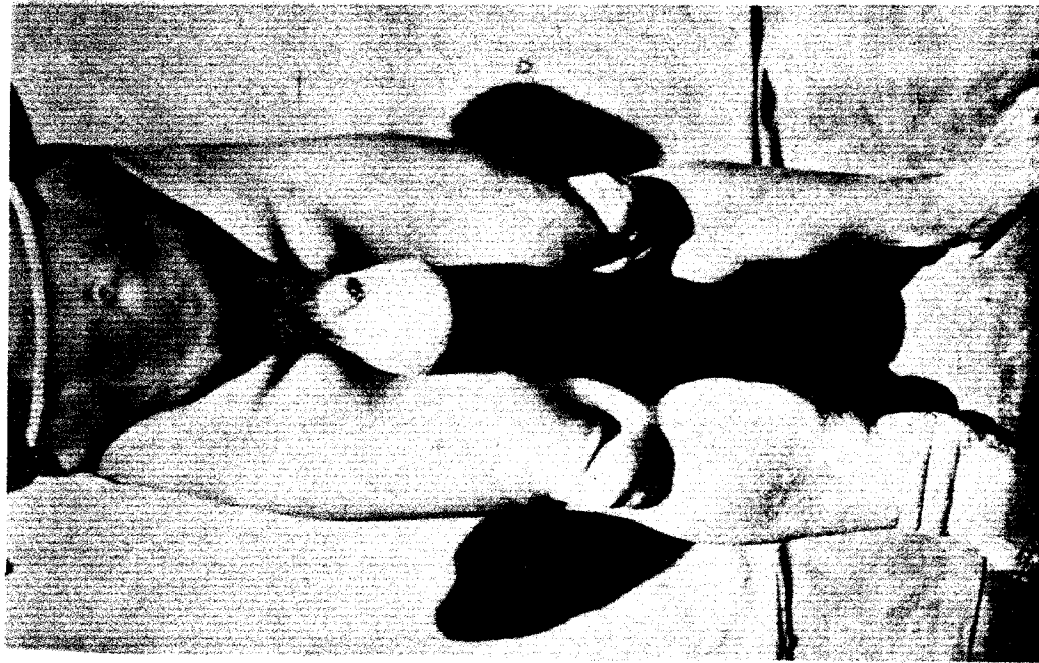


PLATE I  
Ordinary case of Elephantiasis Arabum and Hydrocele, introduced to show the characteristic enlargement of the glands.

for a perfect oval; they measured  $\frac{1}{500}$ "  $\times$   $\frac{1}{750}$ ", or thereabouts. I examined this man's lymph twice subsequently, but though I found abundance of free filariæ embryos both in it and in the blood, I did not find another ovum.

The last case (Plate IV, p. 50) is one in which lymph scrotum, elephantiasis of the leg, and varicose groin glands, all in a typical state of development, were combined. Filariæ were found in blood from the finger and in the lymph from the glands and scrotum. I have given the case in detail to make my readers sure of the diagnosis, and that I might ask the question of the opponents of the parasitic theory of elephantiasis, "Is it possible to regard this combination as mere coincidence? must not these three pathological conditions be the effect of one cause?"

*Possibility of finding remains of Filariæ in the indurated glands of elephantiasis.\*—* After discovering the ova in Case 55, I recollected having seen *débris* of different kinds in gland lymph, which from want of leisure I did not carefully examine. Possibly, I thought, this *débris* is some product of the parent worm, and I set to work to ascertain if in pure elephantiasis any trace of embryo or ova, or products of conception, could be found in the enlarged glands characteristic of that disease. If this could be done, it must be regarded as a direct proof of its filarian origin—as incontrovertible a proof of this as the fossils in the rocks are of extinct races of plants and animals.

First I examined the contents of the vagina and uterine tubes of *filaria immitis*, to acquaint myself with the appearance of aborted eggs and collapsed chorional envelope after the escape of the embryo, and having become familiar with these I thought I could pronounce on the nature of the *débris* I found in gland lymph. I found that in almost all cases of elephantiasis a small quantity of lymph could be expressed into the hypodermic needle from the enlarged glands, and that this contained, either diffused in it or collected into irregular masses, bodies which may or may not be connected with the parasite, but which seem to me to be very like fragments of endothelium. Certainly some specimens look exceedingly like a collapsed bag or remains of an aborted ovum. I would not pronounce on this point, and only mention these unfinished observations as they point in a direction which may yet give us positive evidence. I would have it understood that hitherto the results have been negative.

At the outset of the inquiry it is important to ascertain if the *filaria Bancrofti* is oviparous or not. From what Dr. COBBOLD has written, one cannot arrive, except inferentially, at his views on this point. LEWIS says the filariæ is viviparous, but he thinks the embryo does not burst the chorional envelope, as is usual, but that it stretches this, converting it into an integument.† In asserting that *filaria Bancrofti* is oviparous, I am quite aware that I do so on the

\* Plate I illustrates well the enlargement of the glands usually found in elephantiasis; and also shows that the enlargement occurs on both sides of the body, and is not confined to the side on which the integuments are affected.

† I have lately obtained evidence that this view of LEWIS as to the nature and origin of the sheath enveloping *filaria sanguinis hominis* is probably correct. I find that many of the white-necked crows (*Corvus torquatus*), so common on the coast of China, are the hosts of two kinds of hæmatozoa, possibly belonging to different species. One kind, measuring  $\frac{1}{125}$ "  $\times$   $\frac{1}{300}$ ", is naked, and resembles in appearance and habits the hæmatozoon of the dog; the other species is considerably smaller, measuring about  $\frac{1}{188}$ "  $\times$   $\frac{1}{600}$ ", and is further distinguished from its frequent companion by its truncated tail, its languid sinuous movements, and the possession in most instances of a delicate enveloping sheath. This sheath extends only a short distance from either extremity, hence collapsing to form a lash at head or tail, as the analogous structure in *filaria sanguinis hominis* does on the retraction of the body of the embryo. With the view of ascertaining the nature and origin of this sheath, I made many dissections of infected crows, and at last ascertained that the parent of this particular hæmatozoon had its home

evidence of a single observation, and that objection to my inference will be made on this ground. But in such a case one observation is sufficient to establish a law. If we find that a single individual of a species is oviparous, we have practically sufficient evidence for concluding that every individual of that species is oviparous also.

I hope at some future time to have something more decided to offer on this subject. Meanwhile I pass on to consider a point, ignorance of which has probably led me as well as others into many mistakes. It had always seemed strange to me that the *filariæ sanguinis hominis* had escaped observation in the blood until LEWIS found it there in 1872. One would think there were hundreds of workers in India and in different parts of the tropical world who must have searched the human blood in the aggregate thousands of times, and notwithstanding this the parasite, which in some places is present in every tenth individual, was overlooked or never found for so many years. The explanation of this I now offer. Most workers with the microscope pursue their investigations during the hours when the light is good, that is, during the day. It will be seen from the following remarks that this is the wrong time to search for *filariæ sanguinis hominis*.

*The Periodicity observed by the Embryo of Filaria Bancrofti in the Blood.*—Two years ago, writing on the habits of *filaria sanguinis hominis* (*filaria Bancrofti*), I remarked that in filarious patients the embryos were frequently temporarily absent from the blood. I was not aware at that time of any law governing this. My examinations were usually made in the early morning or late in the evening, and of the two assistants I employed one worked during the day, the other after 6 o'clock in the evening. I remarked that the former made very few finds in comparison to the latter, but attributed this to accident. Several months ago I gave directions for a filarious patient's blood to be examined daily, and a register to be kept of the examinations. On some days there appeared to be great abundance of *filariæ*, on other days none, or very few. I noticed that when they were abundant the examination was made on busy days, when there was much work to be done in the hospital, and extra work of this sort had to be got through in the evening; and that when they were absent, the examination was made during the day. Recollecting the different results obtained by my

in the pulmonary artery, usually on the distal side of the bifurcation. The female on an average measures  $1'' \times \frac{1}{30}''$ , the male  $\frac{3}{8}'' \times \frac{1}{15}''$ , and need not be further described here; suffice it to say that the embryo, as it approaches the vaginal outlet, by dint of energetic movements, gradually elongates the delicate chorionic envelope, until the ovum from being nearly globular becomes oval, and the poles of the oval being still further pushed asunder, the contained embryo from being coiled up lies finally at full length, with the walls of the chorionic sac closely applied to it as a skin everywhere except at the head or tail. During the process of elongation the membrane becomes exceedingly delicate and can be made out only by careful observation. In some instances I have been unable to detect it in the embryo free in the blood, so that possibly it may disappear entirely after a time, even before the parasite has entered the body of the intermediary host.

I have no doubt, therefore, that LEWIS's explanation of the formation of the sheath of *filaria sanguinis hominis* is correct; but I question, for reasons I state, that the stretching process takes place in the uterus or vagina of the parent, as his description would lead me to infer. More likely this occurs after the birth of the ovum, during its passage along a lymphatic. If such is really the case, it is just possible that SALISBURY's *trichina cystica* and the ova of a nematode found by COBBOLD in human urine were really immature *filariæ sanguinis hominis*, as the latter authority believes, the ova having gained access to the urine from rupture of the lymphatic along which they were passing.

I have seen only one other instance of a sheathed hæmatozoon, and this I found in considerable abundance in the blood of the handsome Java pigeon, the *Goura coronata*. The embryo was almost indistinguishable from the human hæmatozoon. Not having found the mature form, I am unable to describe the formation of the sheath, but have little doubt it is the same as in the crow parasite.

assistants according as they worked during the day or after dark, and suspecting now that this was not altogether accident, I made a series of systematic examinations every four hours in this patient and in others, with the view of ascertaining if this periodicity was maintained in every case. I examined a number of patients in this way, with the result of finding that unless there is some disturbance, as fever, interfering with the regular physiological rhythm of the body, filaria embryos invariably begin to appear in the circulation at sunset, their numbers gradually increase till about midnight, during the early morning they become fewer by degrees, and by 9 or 10 o'clock in the forenoon it is a very rare thing to find one in the blood. Till sunset they appear to have completely deserted the circulation, but with the evening they come back again, to disappear in the morning, and so on with the utmost regularity every day and from day to day. The circle is completed every 24 hours, and there are no longer spells of absence, as I at one time supposed, than from morning to evening.

Subjoined is a register of some of the examinations from which I have drawn these conclusions. I have to apologise for the incompleteness of the series of observations in some of the cases, but I often found it very difficult to get a Chinaman to submit during a number of days to the necessary manipulations, and consequently the evidence in such cases is fragmentary. But the numbers, taking them together, are quite sufficient to justify my deductions.

TABLE I.

REGISTER of FILARIA EMBRYOS found in one Drop of Blood from the Finger, obtained at the Hours indicated.

NAME AND DISEASE.	Date.	A.M.										P.M.											
		4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	
PHATA, hospital coolie. Healthy.	1879.																						
	July 30	...	...	...	...														8	...	...	...	...
	" 31	...	...	...	...	0												9	...	...	...	...	
	Aug. 1	...	...	...	...	0								0				24	...	...	...	...	
	" 2	...	...	...	...	0								1					5	...	...	...	
	" 3	...	...	...	...	0								0					11	...	...	...	
	" 4	...	...	...	...	0								0				14	...	...	...	...	
	" 5	...	...	...	...	0								0				13	...	...	...	...	
	" 6	...	...	...	...	0								1					16	...	...	...	
	" 7	...	...	...	...	0								0			7	...	...	...	...	...	
" 8	...	...	...	...	0												...	...	...	...	...		
" 9	...	...	...	...		0											...	...	...	...	...		
TSAO, chair coolie. Re- cent inflammation of cord and testicle.	Aug. 10	...	...	...	0													...	9	...	...	...	
	" 11	...	...	3	...									0				...	4	...	...	...	
	" 12	...	...	...	0													8	...	...	...	...	
PING, farmer. Healthy	Aug. 10	...	...	...	...													17	...	...	...	...	
	" 11	...	...	...	...	0								0				16	...	...	...	...	
	" 12	...	...	...	...		0							0				26	...	...	...	...	
	" 13	...	...	...	...	0								0				14	...	...	...	...	
	" 14	...	...	...	...	2									2			6	...	...	...	...	
	" 15	...	...	...	...		0							0				4	...	...	...	...	
	" 16	...	...	...	...		0							0				26	...	...	...	...	
	" 17	...	...	...	...	2								0				12	...	...	...	...	



TABLE I.—Register of Filaria Embryos—Continued.

NAME AND DISEASE.	Date.	A.M.										P.M.											
		4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	
Tso, chair coolie. Ele- phantoid fever and disease.	1879. July 10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	28	...	...	...	...
	" 11	...	...	6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
	" 14	...	...	...	4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
A gardener. Healthy	July 15	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	13	...	...	...	...	
	Aug. 10	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	25	...	...	...	...	
	" 11	...	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...	20	...	...	...	...	
	" 12	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	3	...	...	...	...	...	
TCHAN. Ulcer of leg...	Aug. 16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	4	...	...	...	
	" 17	...	...	3	...	...	...	...	...	...	...	...	...	...	...	...	...	26	...	...	...	...	
	" 18	...	...	0	...	...	...	...	...	...	...	...	...	...	...	...	...	18	...	...	...	...	
OAH. Case 53. Ele- phantiasis scroti and lymph scrotum.	June 16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	43	...	...	...	...	
	" 17	6	...	...	...	2	...	...	...	1	...	...	...	...	...	...	...	24	...	...	...	57	
	" 18	23	...	...	...	1	...	...	...	0	...	...	...	...	...	...	...	105	...	...	...	21	
	" 19	18	...	...	...	0	...	...	...	0	...	...	...	...	1	10	...	29	37	...	...	89	
	" 20	15	...	...	...	0	...	...	...	0	...	...	...	...	...	...	...	29	...	...	...	41	
	" 21	2	...	...	...	1	...	...	...	0	...	...	...	1	...	...	...	53	...	...	...	34	
	" 22	2	...	...	...	0	...	...	...	0	...	...	...	...	...	...	...	17	...	...	...	43	
	" 23	5	...	...	...	0	...	...	...	0	...	...	...	...	...	...	...	24	...	...	...	...	
	" 24	23	...	...	...	0	...	...	...	0	...	...	...	...	...	...	...	14	...	...	...	13	
	" 25	7	...	...	...	0	...	...	...	0	...	...	...	...	...	...	...	10	...	...	...	...	
	" 26	14	...	...	...	0	...	...	...	0	...	...	...	...	...	...	...	19	...	...	...	...	
	" 27	11	...	...	...	0	...	...	...	...	...	...	...	...	...	...	...	10	...	...	...	...	
	" 28	5	...	...	...	0	...	...	...	...	...	...	...	...	...	...	...	12	...	...	...	...	
	" 29	17	...	...	...	0	...	...	...	...	...	...	...	...	...	...	...	13	...	...	...	...	
	" 30	14	...	...	...	0	...	...	...	0	...	...	...	...	...	...	...	12	...	...	...	35	
	July 1	33	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
PIA. Syphilis .....	July 16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	
	" 17	...	...	0	...	...	...	...	...	...	...	...	...	0	...	...	...	0	...	...	...	...	
BUNSEN. Syphilis.....	July 20	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	5	...	...	...	...	
	" 21	...	...	...	...	0	...	...	...	...	...	...	...	...	...	...	...	0	...	...	...	...	
	" 22	...	...	...	...	0	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	
	" 23	...	...	...	...	0	...	...	...	...	...	...	...	...	...	...	...	0	...	...	...	...	
	" 24	...	...	...	...	0	...	...	...	...	...	...	...	...	...	...	...	2	...	...	...	...	
	" 25	...	...	...	...	0	...	...	...	...	...	...	...	...	...	...	...	12	...	...	...	...	
	" 26	...	...	...	...	0	...	...	...	...	...	...	...	...	...	...	...	2	...	...	...	...	
" 27	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	0	...	...	...	...		
OH. Case 55. Indu- rated and varicose groin glands, and elephanto-œdematous legs.	Aug. 11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	4	...	...	...	...	
	" 12	...	...	...	...	...	0	...	...	...	...	...	...	...	...	...	...	4	...	...	...	...	
	" 13	...	...	...	...	0	...	...	...	...	...	...	...	...	...	...	...	5	...	...	...	...	
	" 14	...	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	3	...	...	...	
	" 15	...	...	...	...	0	...	...	...	...	...	...	...	0	...	...	...	4	...	...	...	...	
	" 16	...	...	...	...	0	...	...	...	...	...	...	...	0	...	...	...	18	...	...	...	...	
	" 17	...	...	...	...	1	...	...	...	...	...	...	...	0	...	...	...	5	...	...	...	...	
" 18	...	...	...	...	0	...	...	...	...	...	...	...	0	...	...	...	...	...	...	...	...		

TABLE I.—Register of Filaria Embryos—*Continued.*

NAME AND DISEASE.	Date.	A.M.										P.M.											
		4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	
HINLO. Case 46 of hamatozoa series. Fever and hydrocele.	1879.																						
	June 23	...	...	...	...	0	...	...	...	...	...	...	...	...	...	...	...	...	33	...	...	...	
	" 24	...	...	7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	7	...	...	...	
	" 25	...	...	...	...	...	...	...	...	...	...	...	...	0	...	...	...	...	...	...	...		
	" 26	...	...	...	...	0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...		
	" 27	...	...	...	...	0	...	...	...	...	...	...	...	...	...	...	...	21	...	...	...		
	" 28	...	...	...	...	...	...	...	...	...	...	...	...	8	...	...	...	...	...	...	...		
	" 30	...	...	...	0	...	...	0	...	...	...	...	...	...	0	...	...	18	...	...	...		
	July 10	...	...	...	...	...	...	0	...	...	...	...	...	...	...	...	...	8	...	...	...		
	" 11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	...		
	" 13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	18	...	...	...		
	" 14	...	...	...	15	...	...	...	...	...	...	...	...	...	...	...	...	3	...	...	...		
	" 15	...	...	...	...	...	...	...	...	...	...	...	...	0	...	...	...	5	...	...	...		
	" 16	...	...	...	0	...	...	...	...	...	...	...	...	1	...	...	...	7	...	...	...		
	" 17	...	...	...	...	19	...	...	...	...	...	...	...	2	...	...	...	4	...	...	...		
	" 18	...	...	...	...	4	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...		
	" 19	...	...	...	...	3	...	...	...	...	...	...	...	...	...	...	...	4	...	...	...		
	" 20	...	...	...	8	...	...	...	...	...	...	...	...	...	...	...	...	10	...	...	...		
	" 21	...	...	...	17	...	...	...	...	...	...	...	...	...	...	...	...	3	...	...	...		
	" 22	...	...	...	11	...	...	...	...	...	...	...	...	...	...	...	...	4	...	...	...		
	" 24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...		
	" 25	...	...	...	...	...	...	...	...	...	...	...	...	...	0	...	...	...	...	...	...		

These figures are abundantly sufficient to establish the diurnal periodicity of the embryo's appearance in the blood. For the meaning of it I think we have not far to look. The nocturnal habits of *filaria sanguinis hominis* are adapted to the nocturnal habits of the mosquito, its intermediary host, and is only another of the many wonderful instances of adaptation so constantly met with in nature. On establishing this fact these questions occurred to me: first, is the disappearance of the embryos brought about by their death, and have we therefore a fresh swarm every 24 hours? second, if they do not die, where do they conceal themselves during the day? third, has this periodicity any pathological significance? With regard to the last of these questions I cannot as yet give any answer. One could speculate very ingeniously with this for a starting point, but as yet I have no fact of any great importance to offer. My conviction is that the pathological significance of *filaria sanguinis hominis* in tropical disease is as yet by no means fully understood, nor the importance of the parasite completely apprehended. To get an answer to the other two questions, being denied the privilege of postmortem examinations of men, I turned to the dog and tried to gain some light from a study of the behaviour of the embryos of the analogous parasite, *filaria immitis*. First I endeavoured to ascertain if there is any periodicity of a similar kind observed by the embryos of *filaria immitis*. I examined a number of dogs with this object in view, and the subjoined table is the result.

TABLE II.

REGISTER of FILARIE contained in a Drop of Dog's Blood obtained from the Ear at the Hours indicated, on successive Days.

BREED.	A.M.												P.M.											
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Spaniel .....	...	...	...	...	...	...	64	...	...	...	...	104	...	...	...	...	...	...	314	...	...	515	...	...
	...	...	...	...	174	...	...	...	65	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	...	...	...	...	...	...	...	...	112	...	24	...	...	...	...	...	...	...	...	693	...	...	...	...
	...	...	...	...	...	...	74	...	...	38	...	...	...	210	...	...	...	...	...	...	...	...	...	...
	...	...	...	845	...	...	...	296	192	...	44	18	63	46	69	82	253	585	...	...	346	...	367	...
	465	...	...	...	...	...	178	...	...	...	177	...	...	...	131	...	...	...	...	...	688	...	...	...
...	...	...	...	344	...	...	...	...	42	...	...	...	...	101	...	...	...	...	...	...	392	...	...	...
...	...	...	...	252	...	...	...	...	...	...	...	29	...	...	...	...	...	...	...	354	...	...	...	...
Spaniel .....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	75	...	...	...	...	...	...
	...	...	...	...	...	21	...	...	...	12	...	...	...	22	...	...	...	98	...	...	...	39	...	...
	49	...	...	41	...	...	18	...	...	...	8	6	7	9	28	35	60	...	...	58	...	...	...	
	...	...	...	...	8	...	...	...	...	5	...	...	...	9	...	...	...	...	...	67	...	46	...	
	...	...	...	...	29	...	...	...	...	...	...	6	...	...	...	...	...	...	...	73	...	...	...	
Black and tan terrier .....	...	...	...	...	...	...	...	16	...	...	...	...	...	...	...	...	77	...	...	...	37	...	...	...
	...	...	...	...	...	...	...	...	19	...	9	...	...	...	...	38	...	...	...	...	48	...	...	...
Black and tan terrier .....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	100	...	...	...	361	...	...	...
	...	...	...	...	...	...	...	25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Chinese dog .....	...	...	...	...	...	...	...	...	...	...	48	...	...	...	324	...	...	...	...	...	1165	...	...	...
Setter .....	...	...	...	...	211	...	...	...	162	...	...	...	145	...	...	...	234	...	...	...	587	...	...	...
	...	...	...	...	166	...	...	...	139	...	...	...	162	...	...	...	185	...	...	...	614	...	...	...
	...	...	...	...	304	...	...	...	293	...	...	...	182	...	...	...	215	...	...	...	656	...	...	...
	...	...	...	...	371	...	...	...	164	...	...	...	301	...	...	...	332	...	...	...	540	...	...	...
	...	...	...	...	453	...	...	...	266	...	...	...	324	...	...	...	...	...	...	...	...	...	...	...

From this it appears that there is a certain periodicity, though not so complete as in the case of *filaria sanguinis hominis*. Embryos are never entirely absent from the blood of the dog, though their numbers are always greater during the evening and night than during the day, the period of greatest scarcity being from about 9 A.M. to 1 P.M. This periodicity has doubtless in the dog, as it certainly has in man, reference to the habits of the intermediary host. One might express it thus:—As regards their hæmatozoa, in dogs there is during the day a remission in numbers, in men an intermission.

Hoping from a postmortem examination to get some information as to what became of the embryos during the period of remission, I procured a large Chinese dog, and for a few days

made a preliminary study of the habits of his blood parasites. But the brute was so wild and in such a continual state of excitement that the regular remission in the numbers of embryos was much disturbed, just as would happen from fever in man. The following is the register of embryos in a single drop of blood from the ear, drawn at the hours indicated on successive days:—

A.M.												P.M.											
1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
...	...	...	...	...	...	...	28	...	...	...	...	14	...	...	19	...	...	...	...	152	...	...	...
...	...	...	...	...	...	...	...	...	332	217	...	...	280	...	104	...	...	235	...	302	...	...	...
...	...	...	...	...	...	...	254	...	224	...	...	...	452	...	107	...	...	...	202	...	...	...	...
...	...	...	...	...	...	...	225	...	196	...	...	...	...	130	...	...	...	...	...	124	...	...	...
...	...	...	...	...	...	...	...	102	...	...	...	...	...	...	...	526	...	...	...	319	...	...	...
...	...	...	...	...	96	...	...	225	...	...	...	...	312	...	...	509	...	...	167	...	...	...	...
...	...	...	...	...	...	151	...	...	...	...	...	...	392	...	162	...	...	...	...	144	...	...	81
...	...	...	...	...	...	...	314	...	...	...	...	...	...	...	128	...	...	...	...	205	...	...	...
...	...	...	112	35	98	82	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

It appeared from this that the embryos were fewest latterly in the early morning; and accordingly I selected one morning at 6 o'clock, when the embryos in a drop of blood numbered only 82, to administer a drop of prussic acid. The heart was found to contain four female and three male filariæ immites. Of the four females, three were crowded with embryos at all stages of development, whilst of one the uterine tubes were quite empty, save for a few dead embryos near the vaginal opening, and the *débris* of a former pregnancy. In the œsophagus were two large *filaria sanguinolenta* sacs, full of parasites, and in the thoracic aorta were many small sacculations and *sanguinolenta* tumours. Slides of blood or fluid expressed from the following organs—each slide amounting to about one drop—contained embryos in the following numbers:—

Blood from ear before death . . . . .	82
„ „ liver after „ . . . . .	324, 365, 204
„ „ lungs „ „ . . . . .	4,582, 1,591, 2,738
„ „ spleen „ „ . . . . .	32
„ „ kidney „ „ . . . . .	0

A second dog was killed, strychnine being used instead of prussic acid. Four female and three male filariæ were found in the right ventricle, and in the œsophagus one immature *sanguinolenta* tumour. Slides of blood gave a very similar result to those obtained in the first dog. No examination of blood before death could be made.

Blood from mesenteric veins after death . . . . .	123
„ „ lungs „ „ . . . . .	2,631
„ „ liver „ „ . . . . .	53
„ „ portal vein „ „ . . . . .	219
„ „ kidney „ „ . . . . .	7
„ „ vena cava inferior „ „ . . . . .	270
„ „ right ventricle „ „ . . . . .	501
„ „ spleen „ „ . . . . .	0
„ „ left external jugular vein after death . . . . .	272

Taken in conjunction with the register of embryos free in the blood at different times of the day, I conclude from these figures that the embryos of *filaria immitis* do not die or disappear after a short existence of less than 24 hours, but that they rest periodically in the minutest branches of the pulmonary artery, and that when they disappear from the general circulation they are to be found in the lungs. How they manage to maintain their position there against the blood current I do not certainly know, but I suppose they attach themselves to the inner surface of the vessels, using their oral extremity as a sucker.\* Occasionally I have seen an embryo thus attach itself to a slide while under examination with the microscope.

I think there can be little doubt that something similar happens in the case of *filaria sanguinis hominis* to what I have shown happens in the case of the embryo of *filaria immitis*, and that during the period it is temporarily absent from the general circulation it lies resting and waiting for sunset in some of the thoracic or abdominal viscera.† What the particular organ is it selects has yet to be ascertained, but this can easily be determined by a microscopic examination of the viscera of a filarious subject dying of a non-febrile disease or suddenly during the day.

*Conclusions.*—By the observations of LEWIS, BANCROFT, and others, and by those I have now and from time to time brought forward, the following conclusions are indicated:—

1. The parent *filariae* live in the lymphatics; this is proved by their young and ova being found there even when absent from the blood.
2. They do not live in the glands, but in the lymphatic trunks on the distal side of the glands; LEWIS and BANCROFT found them in tissues some distance from any gland.
3. They are oviparous (Case 55).
4. The eggs are carried by the lymph current to the glands, and being too large to pass ( $\frac{1}{500}$ "  $\times$   $\frac{1}{750}$ " ), they are arrested there till hatched (Case 55).
5. After hatching the free embryo passes along the lymph vessels and enters the general circulation.
6. Resting in some organ during the day, it circulates with the blood during the night;

\* An excellent demonstration of this adhering power which *filariae* embryos appear to possess I once saw in the blood of *gracupica nigricollis*, called here the white mina. This bird is liable to be infested by at least two kinds of hæmatozoa. The parents of one species lie coiled up in the pockets of the semilunar valves, aortic and pulmonary. (The same parasite is very frequently met with in the same situation in the magpie, *pica media*.) I only know of the existence of the other parasite through its embryo. This organism is about  $\frac{1}{300}$ "  $\times$   $\frac{1}{400}$ ", has a truncated tail, no sheath, and displays very distinct oral movements. It is very active, and from time to time while under observation fastens with its oral extremity to the glass, the body wriggling round and round this fixed point for minutes at a time. Occasionally, while the mouth is thus fixed, the tail is applied and apparently fixed to the glass, the body struggling vigorously between its stationary extremities.

† I thought of trying to ascertain if the same sort of periodicity was observed by the flagellated organisms discovered by LEWIS in the blood of Calcutta rats. Of 30 rats examined to ascertain if these organisms infested the rat in China, as well as in India, six were found to contain them in great abundance. There would therefore have been no difficulty in procuring subjects for observation, but the trouble and cruelty entailed in a periodical examination of the rat's blood are so great that I had to abandon the idea.

7. Whence the mosquito abstracts it and acts as its intermediary host.\*
8. In certain cases the ova or embryos produce obstruction of the lymph circulation through the glands, either directly by their size or indirectly by causing inflammation.
9. If the obstruction be partial, varicosity of glands and afferent lymphatics results, but by means of the anastomoses the lymph circulation is continued, carrying the embryos with it into the blood. Lymph scrotum, or chyluria, or varicose groin glands, with hæmatozoa, are therefore the symptoms of partial obstruction of the lymphatics (Case 56 and many others).
10. If the obstruction be complete, one or other of two things happens,—
  - a. The accumulating lymph so distends the vessels that they rupture and a lymphorrhagia results, which is more or less permanent. In this case the lymph does not quite stagnate, but being able to circulate, though in a retrograde manner, it remains fluid. The symptoms of this form of obstruction are therefore lymphorrhagia from scrotum or leg, varicose glands, and filariæ embryos in glands, and perhaps in discharged lymph, *but none in the blood* (Cases 51, 52, 54).
  - b. If the lymphatics fail to rupture, there is complete stasis of lymph, and excessive accumulation in the tissues on the distal side of the glands; solidification of the glands and tissues, and elephantiasis result. No embryos are found in the blood, as none can pass the glands, and the parent worm or worms probably die choked, so to speak, by the stagnant and organising lymph and their own young. Consequently in pure elephantiasis, as a rule, no embryos can possibly be found in the blood or gland lymph.

Case 51. *Elephantiasis of Scrotum and Lymph Scrotum combined; Filaria Embryos in Lymph from Varicose Groin Glands, but not in the Blood.*—HENG, male, æt. 38; Hooihoah, Tchiunng; chair coolie. He says that he knows of no case of elephantiasis in his family or neighbourhood. Has had an enlarged scrotum for three or four years, which he attributes to his having slept on one occasion on the hillside in the rain. Has six or seven attacks of elephantoid fever every year, accompanied by the usual and characteristic inflammation of the scrotum. Last year there was a discharge from the scrotum, but there had been no

\* A writer in the *Medical Times and Gazette* of 7th September 1878, threw some doubt on the statements I had made as to the relation of the mosquito to *filaria sanguinis hominis*. He appears to have been misled by a paper by LEWIS published in the *Proceedings of the Asiatic Society of Bengal*, for March 1877, in which the digestion of *filaria* embryos by the mosquito is described. For ample confirmation of my observations, I would refer the reader to LEWIS's excellent paper on "The Microscopic Organisms found in the Blood of Man and Animals, and their relation to Disease," in the *Fourteenth Annual Report of the Sanitary Commissioner with the Government of India*, 1877. Dr. BANCROFT, of Brisbane, Australia, the discoverer of the parent worm, has also confirmed them, and I have gone over the ground again without finding any reason to alter my statements. In a pamphlet on the "Diseases of Animals and Plants" recently sent me by Dr. BANCROFT, after describing the part played by the mosquito in nursing and spreading the *filaria*, and the protective measures our knowledge of this renders desirable, he remarks, "I have asked myself who brought this parasite to Queensland, and on looking over the old hospital records, it appears that between the years 1853 and 1862, about 50 diseased Chinamen were admitted into the Brisbane hospital; many of them were from Amoy. The history of some, which was most carefully recorded by the late Dr. BARTON, is that of leprosy. There is not the slightest doubt in my mind that these Amoy Chinese brought *filariæ* with them, as the records of Dr. MANSON show that about one-tenth of his Amoy patients carry *filariæ* in their blood."

discharge since then; and when admitted to hospital, the scrotum had more the appearance of elephantiasis, though it felt softer than it usually does in a well-marked case of this disease. No distinct vesicle or dilated lymphatic visible. The inguinal and femoral glands on both sides were much enlarged, some of them being varicose and others consolidated. He says he never had chyluria nor dysentery.

I thrust the needle of a subcutaneous injection syringe into one of the varicose inguinal glands, and in this way procured a small quantity of milky lymph. In this I found a languid filaria embryo.

The following morning I examined carefully six large slides of this man's blood, equal to about six drops of blood, but could find no embryo filariæ in it. The subcutaneous syringe was again used to extract lymph from the groin glands. In the clear lymph thus procured four filariæ were found in six slides, one slide containing two. The embryos were very languid in their movements, one at least being shrivelled, the lash at its head standing out very distinctly, even when viewed with a low power. Besides the unquestionable filaria embryos, numbers of threads about  $\frac{1}{100}$ " in length were found in the lymph, their appearance suggesting the idea that they were the collapsed sheath of the embryo, the body of which had disappeared by absorption or disintegration.

This man's scrotum was amputated. It had the appearances usually met with in ordinary elephantiasis, and weighed about  $2\frac{1}{2}$  pounds. Though carefully dissected, no mature filaria was found. After the operation the swelling of the glands subsided, and the case did well. Though examined daily for nearly a month, no embryo was ever found in his blood.

Case 52. *Lymph Scrotum; Varicose Groin Glands; Elephantoid condition of the Skin of Left Thigh; Filariæ in Lymph from Groin Glands, but none in the Blood.*—BÈK, male, æt. 28; Tchiupo; farmer. He lives in a village (called Kaabor) of about 1,000 inhabitants, within a few hundred yards of the large town of Tchiupo. Tchiupo is about 8 or 10 miles from the sea, in the middle of an extensive rice plain. The drinking water for the town and village is procured from a small running creek, and during hot weather is often drunk without the precaution of boiling it.

In his village he knows of two cases of very large elephantiasis scroti, and two cases of elephantiasis of the leg, a man and a woman. The woman is his mother. A brother and two sisters are healthy; his father appears to have died of phthisis.

The disease for which he applied commenced eight or nine years ago with fever and two red, painful, and inflamed streaks on the inner surface of the left thigh, a little above the knee, and passing up to the groin; shortly afterwards the pain attacked the other groin. He says that the pain preceded the shivering and fever. The swelling at first was trifling, but similar attacks recurring about 20 times a year, the swelling became more marked, and about a year ago the scrotum inflamed and became involved in the disease. The scrotum has inflamed seven or eight times.

Never had chyluria, dysentery, nor, unless when the leg and scrotum inflames, fever.

The integuments of the left thigh, over its inner, anterior, and posterior surfaces, is distinctly elephantiasised from the knee to a point about two-thirds up the thigh. The rest of the limb appears quite normal, but in this situation the skin is darker than that on the corresponding part of the other thigh; it is coarser, and cannot, especially about the centre of the affected patch, be pinched up into a fine fold, but feels brawny and as if anatomically continuous with the subcutaneous tissue. When one of his usual attacks of fever occurs, this patch of skin becomes red and distinctly swollen.

Groin glands, both inguinal and femoral, and on both sides, much swollen and distinctly varicose.

The scrotum is a good specimen of lymph scrotum, and does not require further description.

I introduced a subcutaneous syringe into one of the varicose inguinal glands on the right side, and easily obtained a supply of milky lymph. In this, during a short and hurried examination, I found one perfect but rather languid filaria embryo. A large slide of blood from the finger was examined at the same time, but without finding filariæ. On the following morning I again aspirated the same gland and procured a darker and more bloody lymph. Lymph was also drawn from the left femoral and left inguinal glands, and in all of these specimens of filariæ were found. A slide of blood from the finger was examined at the

same time, but, as on the previous day, it was devoid of embryos. The patient did not remain under observation.

Case 53. *Lymph Scrotum and Elephantiasis of Scrotum combined; Filariae in Lymph and Blood.*—OAH; male, æt. 19; Khoan Rau, Eong; a rice miller. Parents are dead; no relatives, as far as he knew, affected with elephantoid disease.

Eong is a small hamlet, of about 100 inhabitants, in the suburbs of Khoan Rau. The people drink well water, which is stored in large jars, and often kept for several days, no particular attention being paid to keeping the jars covered or clean. When 16 or 17 years of age, was frequently laid up with attacks of an evanescent fever, accompanied by a relapsing inflammation (it may have been of the testicle) in the right side of the scrotum, and enlargement of the right and left groin glands, more particularly of the right. When 15 he had abscess in the left groin (scar is visible still), and another the same year in the right leg, near the ankle; at the time the whole leg was swollen (describes it as "toa rka tang," the expression for elephantiasis of the leg). This swelling remained for about one month, but subsided on the bursting of an abscess, and now no thickening remains. The scrotal inflammation and the fever recurred about 20 times each year, but it was not until about a year ago that the scrotum discharged. The discharge occurred daily for some time, and again dried up for about three months; but since three or four months hardly a day has passed without an escape of lymph. When he came for the first time to hospital there had been no discharge for several hours. A vesicle was pricked, and from then till the time these notes were made—four days—it has dripped constantly. In one hour I saw collected two ounces of a milky coagulating lymph.

Four days subsequent to his admission I examined the scrotum carefully. He had it trussed up in a headcloth, on removing which a fine stream of lymph was forcibly projected by the contraction of the dartos, as if by a syringe, from a minute orifice at the lower part of the scrotum. Half an ounce ran in a fine capillary stream in the course of a couple of minutes. The scrotum was as large as an average pumelo. The skin of the penis was found to be distinctly elephantiased, and the skin visibly and palpably thickened over both groins, the lower two inches of the abdominal wall, and over Scarpa's triangle on both sides. The upper and thigh surfaces of the scrotum were covered by a fine silky skin, freely movable over the thickened substratum; a little lower down the skin was thickened and adherent as in elephantiasis; lower still small ampullæ were visible; lower down these became larger, and along the raphe they were the size of small beans. Pricking any of these vesicles the usual fluid escaped. This was most distinctly a combination of elephantiasis and lymph scrotum. The groin glands were large, but they did not feel varicose; however, on piercing a gland on the right side abundance of straw-coloured lymph was procured; in this fluid I found filariæ. I examined the lymph which dropped from the scrotum, and also the blood (procured from a finger), and in both of these I found filariæ embryos. During the short time required to make these notes, more than three ounces of fluid distilled from his scrotum. In a few ounces of this fluid, a feeble coagulum formed on standing, which in the course of 8 or 10 hours contracted to about one-sixth the bulk of the fluid. The clot was then tough and fibrous. A small portion was removed and placed between two glass slides and firmly pressed out; in the fluid thus expressed, surrounding and within the open meshes of the fibrine, were very many living specimens of *filaria sanguinis hominis*. I found none in the serum the clot floated in. It would appear, therefore, that the coagulating fibrine caught the filariæ, and, contracting, carried them as in a net, thus concentrating them in the clot. Some of the filariæ were very robust and active; others were languid, spotted, and shrivelled-looking. In one such atrophied specimen the lash was quite visible with a low power, as were also many short fibres about  $\frac{1}{100}$ " in length. Twelve hours afterwards the coagulum had completely disappeared; a flocculent sediment lay in the glass, and in this great numbers of filariæ were found.

I removed this scrotum; shortly after removal it weighed about a pound and a half. It was placed in spirit and sent to Dr. SPENCER COBBOLD. At the time of the operation there was considerable bleeding, and also an escape of lymph from two dilated lymphatics, one on either side, just external to the spermatic



cords. If I pressed firmly with my hand on the enlarged inguinal glands, lymph could be made to well up in great plenty from these two points. This man was kept under observation for upwards of two months. The wound healed soundly, and the glandular swellings decreased. His blood was examined daily, and for some time six times in the 24 hours; but unless the examination was made during the day it was found invariably to be full of filariæ embryos. Mosquitoes were also fed on his blood, and the embryos ingested by these insects were found to undergo the metamorphosis I described some time ago. (The register of filariæ found in this man's blood after the operation is given in Table I on page 38.)

The diagnosis of lymph scrotum passing into elephantiasis in the case just narrated subsequently received singular and unquestionable confirmation. The man returned to the hospital with his right leg, the flaps left at the operation, the cicatrix, and the integuments of the lower part of the abdomen all in a typical state of elephantiasis. He stated that he had kept quite well for four months after leaving me (that is, for six months after the operation), and was able to resume his rather fatiguing work of rice pounding. He was then attacked with elephantoid fever, and pain in the right groin, and sometimes had a discharge of straw-coloured fluid from the operation cicatrix and also from the thickened skin over right groin and thigh. As he is covered with itch, it is probable that this discharge was provoked by his scratching. Three months ago the right leg inflamed and swelled up to a great size, and since then he has had three attacks of this inflammation and elephantoid fever. He says he had also a large swelling at one time on the upper and inner surface of the left arm, which threatened to suppurate, but, after troubling him for 10 or 12 days, disappeared spontaneously. The skin of the flaps and the cicatrix are rough, hard, and tuberculated as in elephantiasis of some standing, the skin over the abdomen and groins is coarse and evidently considerably thickened, while the swelling of the thigh and leg is best described as brawny, the stagnant lymph being not as yet incorporated as a tissue. The glands are so obscured by the overlying integuments that it is difficult to make out positively their exact condition, but those on the right side are certainly enlarged. (Plate II.)

Measurements of the legs give the following results:—

	RIGHT.	LEFT.
Thigh at crutch . . . . .	21½ inches.	18½ inches.
„ upper third . . . . .	22 „	19 „
„ middle . . . . .	20¾ „	17 „
Knee . . . . .	18½ „	13½ „
Calf . . . . .	15½ „	12½ „
Ankle . . . . .	10½ „	8¾ „
Instep . . . . .	10¼ „	9½ „
Base of toes . . . . .	9¾ „	9½ „

The same evening his blood was examined. One drop drawn at 6.30 contained one filaria; one drop drawn at 7 contained 14 filariæ. It is evident from this persistence of embryos in the blood that the parent worms were not removed when the scrotum was amputated—at least not all of them. From this fact and the large number of embryos his blood contains I believe there are several parent worms still in his lymphatics. The tumour he had on his left arm, which came and went so quickly, was, I have little doubt, caused by some obstruction of the lymphatics brought about by filariæ.

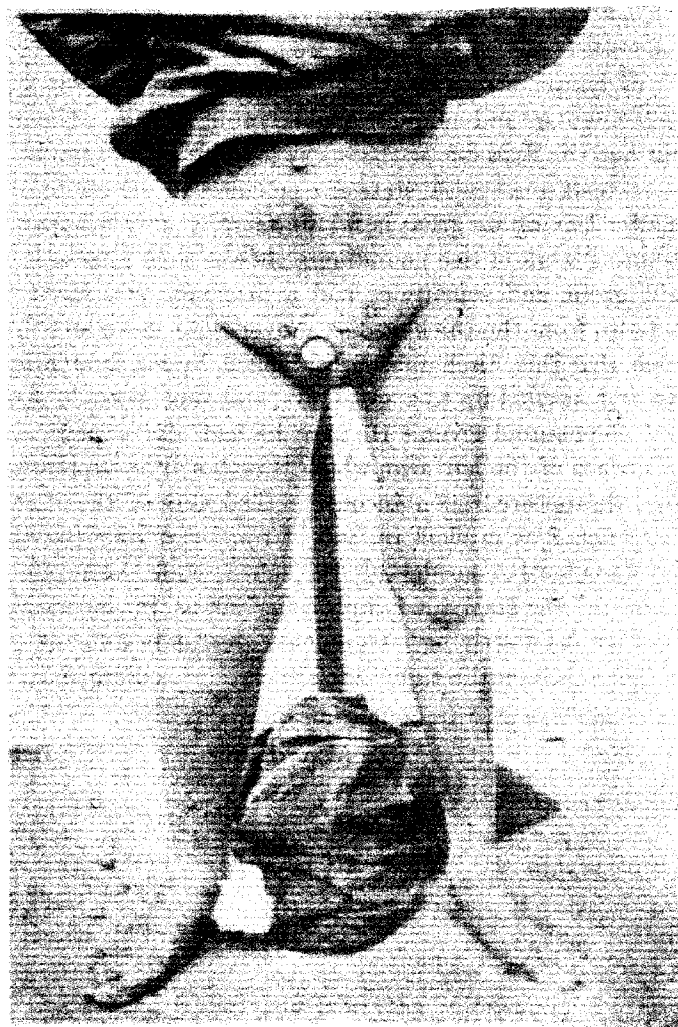


PLATE II.

I can conceive of no stronger proof that elephantiasis and lymph scrotum are but varieties of the same disease than is supplied by this case. When the lymph scrotum, or, in other words, the tissue permitting the escape of lymph, was removed by an operation, elephantiasis, or, in other words, complete stasis and organisation of lymph, began. This is certainly consequence, and not merely coincidence.

The case further illustrates the not unusual occurrence of lymph scrotum ending in elephantiasis. The converse phenomenon, elephantiasis passing into lymph scrotum, is much more unusual, in fact until lately I never saw a case of it. As this case, along with OAH's, forms a sort of crucial test of the truth of my views as to the relations of elephantiasis and lymph scrotum, I am induced to give the following particulars:—

Some eight or nine years ago, I removed an elephantiasis scroti weighing 10 pounds from a man called ONG AN. His case is No. 10 in the series of elephantiasis operation cases.\* He went home after the operation quite well, and I lost sight of him until quite lately, when he called on me and gave the following account of himself. After leaving the hospital he returned to his fields and worked hard as an ordinary labourer. For about five years his scrotum gave him no trouble whatever, but kept sound and free from inflammation and swelling of any sort; and in other respects he enjoyed excellent health. About this time, however, he had a mild attack of elephantoid fever; and since then, especially after unusual exertion, has had many similar attacks, about five or six, he says, every year. The fever is not accompanied by distinct inflammation of the scrotum, but this swells and feels painfully constricted. Sometimes, about three times a year, but only for the last three years, he has a discharge of milky coagulating fluid from the scrotum. When the discharge begins to flow it is clear, like water, but after running for five or six hours it gradually becomes opaque and milky, and, continuing so for six hours longer, it gradually ceases to flow. He is quite positive in his statement that he never had any sort of lymphorrhagia before the operation, and neither before nor since has he had chyluria.

I carefully inspected his genitals, and found them as far as the operation was concerned in a very satisfactory condition, nearly free from elephantoid thickening, and with the flaps freely movable over the testicles. The right flap is the larger, and just at its most dependent part there is a circle an inch and a half in diameter of slightly elephantiased tissue. The cicatrix and penis are quite sound. Nearly over the whole of the surface of the scrotum, especially at the lower and back part, are scattered at wide intervals minute vesicles milky white and no larger than pins' heads. They are arranged singly, in irregular groups, and in short beaded lines. One of these vesicles I opened, and procured in a very short time a large quantity of milky white coagulating fluid of the usual lymph scrotum character. Perhaps in half an hour I collected two ounces. The inguinal and femoral glands of the left side are large and solid, those of the right side are nearly normal.

I examined his blood carefully four times betwixt 6 P.M. and 9 P.M., but it contained no filariæ; neither could I find any in the sediment of three ounces of scrotal lymph.

As explaining this supervention of lymph scrotum on elephantiasis, I assume that the lymphatics carrying the lymph from the apparently sound operation flaps were damaged before the date of the operation, but only slightly so; that gradually they are becoming more occluded from contraction, and are now no longer capable of transmitting the entire production of lymph by the tissues. When the obstruction has become complete, and should the accumulating lymph not be discharged from the surface of the scrotum at short intervals, this man will certainly have a recurrence of his elephantiasis. The filariæ, the cause of his disease, died on the formation

\* See Customs Medical Reports, iii, 33.

of the original tumour, but not before they or their offspring had permanently damaged the lymphatic system of the scrotum.

Case 54. *Elephantiasis of Leg; Varicose Groin Glands; Lymphous Discharge from Leg; Filariae in Groin Glands, but not in Blood* (Plate III).—TCHENG, male, æt. 19; Amoy; a paper gilder. No elephantiasis in family or neighbourhood. About 10 years ago was attacked with shivering and fever, accompanied by swelling and pain in the right popliteal space. The fever and great pain continued for about a fortnight, and the swelling for a month or two longer. An abscess burst and healed, but ever since a clear, yellow, lymphous fluid has distilled from the skin over the site of the abscess, and from the back of the calf of the leg. He says he has many attacks of fever every year, accompanied by pain, but no particular swelling of the leg or of the groin glands. Never had chyluria nor dysentery.

His body is fairly developed for his age, notwithstanding his fever. The groin glands, both inguinal and femoral, are much enlarged, those on the left most so, and distinctly varicose. Those on the right—the side affected with elephantiasis—slightly varicose and not so prominent as on the other side, though still very large; they are also much more dense and firm to the touch. On inserting the subcutaneous syringe into a varicose gland in the left groin, abundance of dark red fluid was withdrawn. The fluid coagulated rapidly; the coagulum disappearing in six hours, a copious dark red sediment formed at the bottom of the glass. In this sediment I found great numbers of living and very active filariæ. The bulk of the sediment was composed of red blood corpuscles.

The right leg is enlarged from the upper third of the thigh downwards. Though rougher than in health, the skin is not so rough, except about the foot, as in long-standing elephantiasis; but it is dense, adherent to subjacent tissues, and in every respect like the integument characteristic of that disease. From the ham to the lower third of the leg, the whole of the calf and part of the sides and front of the leg are covered with a sort of weeping eczema. Examined carefully, the patch of skin thus affected is seen to be defined at its margin and slightly elevated, reddish on the surface and finely papillated. No breach of surface can be detected, but on pressing it firmly with the point of the finger, a clear yellow lymph is made to well up from the surrounding tissue as if from a sponge. There are two firm elevations in the popliteal region about the size of pigeons' eggs, rough and encrusted on the surface, badly defined at the base, and yielding much discharge. These elevations represent the seat of the abscess. Unlike ordinary elephantiasis, the calf of the leg is the least swollen part, and it is just this part that the discharge issues from so copiously.

Measurements of the legs:—

	RIGHT LEG.	LEFT LEG.
Upper thigh . . . . .	19 inches.	16 inches.
Middle „ . . . . .	18½ „	16 „
Knee . . . . .	18 „	13 „
Middle calf . . . . .	14½ „	12 „
Heel . . . . .	16 „	13 „
Instep . . . . .	12½ „	9½ „
Toes . . . . .	10 „	8 „

Three large slides of blood from a finger drawn at 7 P.M. contained no filariæ. Next morning at 6 o'clock two more slides were carefully searched, but with the same result.

The leg was dressed with zinc ointment, and I note a week afterwards that the discharge had considerably decreased, the leg feeling heavier and stiffer. Blood drawn from the finger at 7 A.M. was again examined, but was devoid of filariæ.

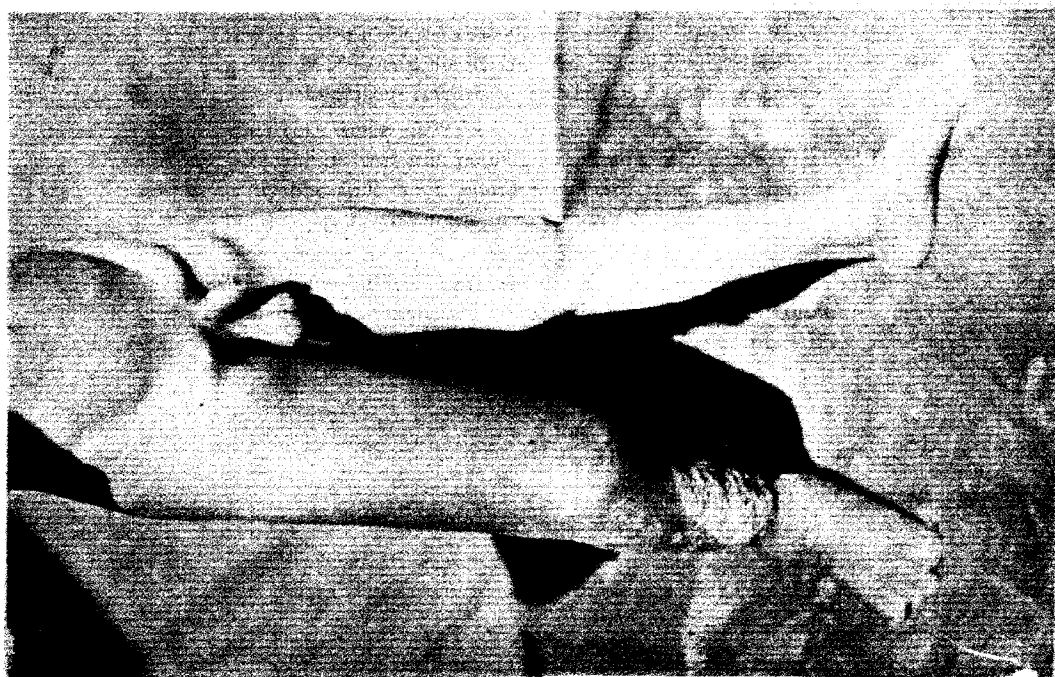
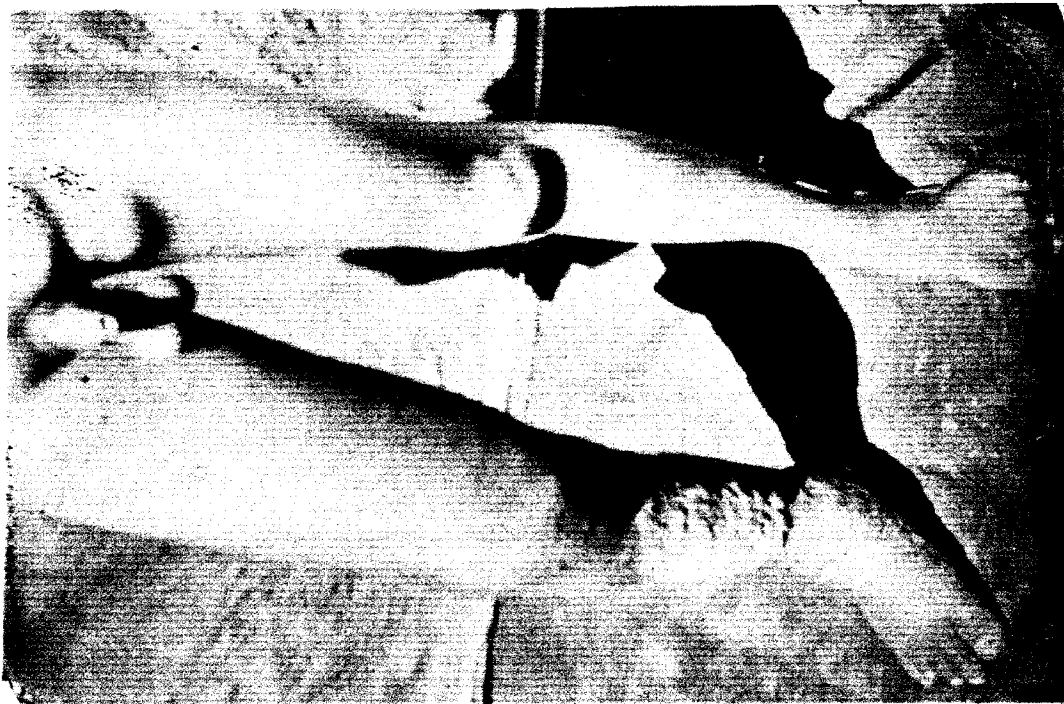


PLATE III.

Three days later I note—"There is now very little discharge from the leg. The right inguinal and femoral glands, with the exception of the most internal of the inguinal glands, feel more solidified. The latter gland is distinctly varicose." The following are now the measurements of the leg :—

Upper thigh . . . . .	19 inches.
Mid-thigh . . . . .	18 $\frac{3}{4}$ "
Knee . . . . .	19 "
Mid-calf . . . . .	14 $\frac{1}{2}$ "
Heel . . . . .	16 "
Instep . . . . .	12 "
Toes . . . . .	9 $\frac{3}{4}$ "

"Left inguinal and femoral glands very prominent and distinctly varicose. At 7.30 P.M., subcutaneous syringe introduced into left inguinal glands, and sanguineous lymph readily obtained. About half an ounce was collected in a glass, and left to stand. Before coagulation, two large slides of this were examined, but no filariæ were found. The syringe was again employed to abstract lymph from the varicose gland, already described as the innermost of the enlarged glands on the right side; in one slide of this two languid filariæ were found.

"Glasses containing specimens of lymph from both sides were now placed under cover to await resolution of coagulum and the subsidence of any embryos they might contain. Twelve hours afterwards the coagula had contracted to one-sixth their original bulk; they had become of a bright red colour, and floated in a milky serum. In the sediment of the fluid, and in the coagulum from the left side, several live embryos were found during a short examination. The examination of that from the right side was very brief and imperfect, and discovered nothing. Next day, however, the coagula in both glasses had completely disappeared, and in the sediment of both specimens many dead filariæ were found. Blood from the man's finger drawn at 9.30 A.M. contained no filariæ."

A fortnight later I note—"Withdrew by the canula of subcutaneous syringe about six ounces of slightly sanguinolent lymph from the left inguinal glands, and also about two ounces of a similar fluid from the right inguinal glands. These on coagulation and subsidence, after 24 hours, yielded a very few filariæ in the sediments. In one slide of lymph, from the right glands, an embryo with very distinct lashes was seen in close proximity to an involuted membrane, which, as far as appearance and size went, might have been the remains of the ovum from which the neighbouring embryo had been squeezed by the weight of the cover glass. Blood from the finger drawn at 10 P.M. yielded no filariæ."

Case 55. *Filaria Sanguinis Hominis in Blood; Enlarged, Indurated, and partly Varicose Groin Glands; Elephanto-œdematous Legs; Ova of Filaria in Lymph from Groin Glands.*—OH, male, æt. 44; Tchang-tchui, Toanasia; a farmer. Mother alive and well; father dead, killed in a typhoon; had two brothers, but they were killed years ago by the Taipings; no sisters.

There are about 1,000 inhabitants in his village. Years ago he recollects a man with a big elephantiasis scroti, who was killed by the rebels at the same time as his brothers. The little boy who brought him to the hospital has a huge elephant leg. Besides these, he knows of no other cases of elephantiasis in his village.

Drinks, generally, well water, but when working in the fields often drinks from the paddy-field runnels. The well water is stored in a jar without a cover; the jar is filled every second day, but cleaned only once every five or six days.

He says he has had enlarged glands since boyhood, but never had pain nor inflammation in them, nor have they altered much in appearance during many years. When very young—about 20—had quartan ague for a month or two, but until last year had, on the whole, excellent health. Last year, however, in the fourth month, after indulging in a little wine he fell asleep, and woke up with rigors, followed by fever, not

so severe as to prevent him working. He noticed that his legs, both of them, had swollen. The legs remained enlarged for eight months, and on the inner surface of the left thigh a pustular eruption broke out; but by the beginning of the present year, eruption and swelling had quite subsided, and he was in his ordinary state of health. In the fourth month he had a severe attack of fever and diarrhoea, during which the legs swelled again, and until now they have remained so. In the morning they are less, and in the evening larger.

When he presented himself at the hospital he was excessively anæmic, but the swelling of the legs was too brawny for the ordinary œdema of anæmia, yet too soft for the thickening of elephantiasis. It readily pitted on firm pressure. The heart and urine were normal.

The inguinal and femoral glands on both sides are much enlarged, and in shape characteristic of *filaria sanguinis hominis*; but they are firmer and more solidified than those usually met with in lymph scrotum, and softer than those usually found in elephantiasis. One gland in the left groin—the uppermost and outermost gland—felt slightly softer than the others, and a hypodermic syringe drew off from it a small quantity of perfectly clear lymph. In this lymph I found 11 ova, presumably of *filaria sanguinis hominis*, and one languid free embryo. The ova were all advanced to the last stage of development; each contained a perfect embryo, which moved about inside the delicate wall in a rotatory fashion, just as I had seen the embryos of *filaria immitis* when close to the vaginal end of the uterus. The ovum was oval, the extremities of the long diameter having a tendency to “point.” The dimensions were  $\frac{1}{300}'' \times \frac{1}{750}''$ . I saw no trace of lash in the embryo. In one slide of blood from the finger, taken at the time the lymph was abstracted from the gland, four filariæ were found (Table I, page 38).

Two days afterwards I pierced the same gland and abstracted a small quantity of bloody lymph. In this I found neither ova nor embryos, but following the needle as it was withdrawn, there escaped a drop or two of bloody lymph; in this were found 35 active and free embryos, but no ova; at the time of this examination, blood from the finger contained 12 embryos to the drop.

Two days subsequently I again pierced the same gland, but got only a mere trace of lymph, and in this I found one vigorous embryo, but no ova.

Case 56. *Elephantiasis of Left Leg; Lymph Scrotum; Varicose Groin Glands; Filariæ in Lymph from Scrotum and Groin, and in the Blood* (Plate IV).—TAIKOAN, male, æt. 28; Tehiupo, Baepi, Khitan; a farmer.

No elephantiasis in his family, but in his village of 700 or 800 inhabitants, he knows of four cases of elephantiasis of the leg and four of the scrotum.

Drinks well water of good quality, which, however, is stored in an open jar, often for several days, and when renewed the jar is not always cleaned out. Never drinks paddy-field water.

When 13 years of age, had shivering and fever, with inflammation of the left leg and both groin glands. He recovered in three or four days, but henceforward he became liable to such attacks, at very irregular intervals however, sometimes once or twice a year, sometimes as often every month. With each attack the volume of the leg increased. The scrotum was similarly affected, and at the same time; occasionally it discharged, perhaps daily, perhaps once in three or four days.

Never had chyluria nor dysentery.

His body generally is in good condition. The right leg looks quite normal. Left leg is in a state of advanced elephantiasis, and a small ulcer has formed in front. Measurements are as follows:—

Right calf . . . . .	12 inches.	Left calf . . . . .	16 inches.
„ instep . . . . .	10½ „	„ instep . . . . .	14 „

The foot is very much expanded in all directions, and its skin is thickened, glabrous, and in thick folds at the flexures.

Groin glands on the left side are much enlarged, soft, varicose, and very prominent. Those on the right similarly affected, but to a smaller extent, though still quite distinctly.



PLATE IV.



The scrotum is an excellent specimen of a lymph scrotum, though from the contained lymph being sanguineous the parts have a purplish tinge. A vesicle opened on the lower part emits with considerable force a stream of bloody lymph, and one can collect two or three ounces in as many minutes.

August 14th.—At 6.30 this morning I aspirated the left groin glands and got abundance of bloody lymph, in which active filaria embryos abounded. A quantity of this lymph, and also lymph from the scrotum, were put aside to coagulate. By 5 P.M. the coagulum had contracted to one-third the bulk of the entire lymph; it was of a bright red, and floated in a straw-coloured fluid. In coagulum from the glands, on tearing off a piece and compressing it firmly between two strong slides, I saw many filariæ imprisoned in the fibrine, which restrained their movements, thereby making their detection rather difficult. No filariæ found in the serum of either gland or scrotum lymph. Next morning, 24 hours after the lymph was drawn off, the coagula in both specimens had disappeared, and the coloured corpuscles, sinking as usual to the bottom of the glasses, formed a dark brown sediment. In this filariæ were found, but not many.

Blood from the finger about 8 o'clock the previous night contained about 8 filariæ to the drop.

August 15th.—Aspirated at 7 P.M. the same gland, and most carefully searched two large full slides of the lymph; not one embryo found. Aspirated a gland on the right side, and examined most carefully one large full slide; not one embryo. The lymph from both sides was of exactly the same character as that drawn previously. About four drachms of both fluids left standing to await coagulation and subsidence. Two slides of blood from the finger carefully searched, but no filariæ found; however, when the blood was examined at 9.30 P.M., 15 filariæ were found in one drop.

August 16th.—Pierced another gland on the right side at 6 A.M. Bloody lymph in great abundance, with plenty of filariæ; one slide contained 6, another 3; one slide of finger blood contained one. At 6 P.M. the coagula of last night's lymph had disappeared, a dark brown sediment and a milky fluid taking its place in both glasses. In a full, large slide of the sediment from the left side lymph I found 4 active filariæ, but in a similar slide of the right side lymph I could not find any.

The lymph drawn this morning still coagulated, but, August 17th, 6 A.M., the coagulum had disappeared, and in one drop of sediment I found 23 active filariæ.

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B.—Table showing Results of 140 Cases of Stone in the Bladder, operated upon at the Native Hospital in Canton by FLEMMING CARROW, M.D.

THAT in the Kwangtung province calculus of the bladder should be so frequently met is a fact for which I am unable to account satisfactorily. Causes exist in the northern provinces which might lead one to predict its frequency, yet it is, comparatively speaking, rarely found except in Kwangtung and Kwangsi. One of the causes operating in the south of China is that the rivers flow through districts rich in lime, and that the water used by the natives holds a considerable quantity of lime in solution. As a proof of this, it will be noticed in the following table that a large majority of the cases cited are boatmen and farmers, or farm labourers—those who use the river water in cooking and as a drink. Again, it may be caused by a condition of the system which prevents the proper assimilation of the food, and thus allows certain chemical constituents of the nourishment taken to be deposited from the urine either in the form of lithic or phosphatic gravel. But why should these conditions of the system exist to so great an extent only in the southernmost provinces of China? This may perhaps be explained by peculiarity of climate—malarial influences—or may depend upon the articles of food used by the natives—the latter most probably, as it has not been found that foreigners have the disease developed even after a long residence in the Kwangtung province. The belt of country extending south-west of Canton, and running into Siam and the Laos region, seems also to be a favourite locality for the development of the disease. Dr. CHEEK, of Chingmai, has told me that the people of Laos are very subject to the disease. Between these different theories it is difficult to choose, but for myself I am inclined to think that all these influences exist and tend to develop the disease, especially since there are many points in which the climate of southern China resembles that of Kentucky and Tennessee, where calculous disorders largely prevail. The cases tabulated below were operated upon in the Medical Missionary Society's Hospital, and under conditions favourable to recovery. I have found that the Chinese do not apply for operation until they have tried their own doctors for a long time (who for this disease use the moxa, and apply the actual cautery in different ways to the abdomen), and then, finding their skill of no avail, and the pain constantly increasing as the stone increases in size, they come to us as a *dernier ressort*. By this time the system generally is very much broken down, there is considerable inflammation of the bladder, and a discharge of mucus containing a considerable quantity of pus. Added to this, many of these patients are opium-smokers, and are very anæmic. We thus have grave obstacles to overcome before the patient is in a condition to stand the operation. The mode of operating has been by the ordinary lateral incision, but some of the stones have been so large that I have had to crush them through the incision, and thus remove them piecemeal. In this way, in one case the rectum was ruptured by the sharp edge of a piece of stone, and a vesico-rectal fistula was the result; the patient recovered, but the urine ever after escaped by the anus. The history of the cases presented no unusual character; those that recovered followed the usual course, and the few that died took on inflammation, which soon

proved fatal. The outer wound heals very quickly as a rule, and Dr. KERR has lately had a case which healed by the "first intention." After operation we have been in the habit of allowing patients only a milk diet, and on this they make very rapid recoveries.

TABULAR STATEMENT of 140 Cases of URINARY CALCULUS.

AGE.	OCCUPATION.	DURATION.	CHEMICAL COMPOSITION.	WEIGHT.			RESULT.
				Oz.	Dr.	Sc.	
41	Labourer .....	3 years ...	Uric acid .....		3	1	Recovery.
23	" .....	4 " .....	" .....	1	0	0	"
24	" .....	1 " .....	" .....		4	0	"
6	" .....	1 " .....	" .....		2	1½	"
3	" .....	6 months...	" .....		4	1	"
41	Boatman .....	2 years ...	" .....		2	0	"
46	Barber .....	2 " .....	" .....		3	1½	"
51	Labourer .....	3 " .....	" .....		4	0½	"
7	" .....	1½ " .....	" .....	1	2	0	"
14	" .....	6 months...	" .....	1	2	1	{ Recovered with vesico-rectal fistula.
70	Farmer .....	9 years ...	" .....	2	7	1	Died.
31	" .....	4 " .....	" .....		4	2	Recovery.
25	" .....	2 " .....	" .....		3	2	"
16	Boatman .....	6 months...	" .....		3	1½	"
55	Scholar .....	3 " .....	" .....	1	0	0½	"
42	Teacher .....	2 years ...	" .....		2	1	"
44	Farmer .....	4 " .....	" .....		2	2	"
16	Boatman .....	1 " .....	Phosphates .....		2	2	"
61	Farmer .....	2 " .....	Uric acid .....		3	0½	"
17	Boatman .....	2 " .....	" .....	1	3	2	"
18	" .....	4 " .....	" .....		4	0½	"
40	Labourer .....	8 " .....	" .....		2	2	"
31	" .....	12 " .....	" .....		2	1	"
27	Farmer .....	1½ " .....	" .....		7	1	Died.
29	Shopkeeper .....	3 " .....	" .....		6	2	Recovery.
9	" .....	6 months...	" .....		4	0	"
3	" .....	1 year ...	" .....			2	"
71	Trader .....	6 " .....	" .....	1	6	2	"
68	" .....	3 " .....	" .....		7	0½	"
41	Boatman .....	5 " .....	" .....		6	0½	"
26	" .....	5 " .....	" .....	1	2	2	Died.
20	Farmer .....	1 " .....	" .....		3	1½	Recovery.
10	" .....	6 months...	" .....		1	1	"
40	Farmer .....	3 years ...	" .....	1	0	2	"
4	" .....	6 months...	" .....		2	0	"
9	" .....	3 " .....	" .....		2	2	"
12	" .....	2 years ...	" .....		3	0½	"
45	Barber .....	2 " .....	" .....	1	2	2	"
41	Boatman .....	3 " .....	" .....	1	0	0	"
43	" .....	Duration and weight of calculus lost .....	" .....				"
33	Boatman .....	2½ years ...	Uric acid .....		4	1	"
12	" .....	6 months...	" .....			2½	"
45	Farmer .....	2 years ...	" .....	1	0	0	"
43	" .....	1 " .....	" .....		3	0½	Died.
24	Labourer .....	3 " .....	" .....		2	1	Recovery.
26	" .....	2½ " .....	" .....		3	0½	"
2	" .....	1 " .....	" .....		2	1	"
20	Boatman .....	2 " .....	" .....		3	0	"
42	" .....	6 " .....	" .....		2	2	"
44	" .....	2 " .....	" .....	1	0	1	"
40	" .....	3 " .....	" .....		3	1	"
20	" .....	1 " .....	" .....	1	0	0	"
29	Shopkeeper .....	2½ " .....	" .....		3	0	"
33	" .....	4 " .....	" .....		2	1	"

Tabular Statement of 140 Cases of Urinary Calculus—Continued.

AGE.	OCCUPATION.	DURATION.	CHEMICAL COMPOSITION.	WEIGHT.			RESULT.
				Oz.	Dr.	Sc.	
44	Labourer.....	2 years ...	Uric acid .....		3	2	Recovery.
62	" .....	9 " .....	" .....		6	0	"
51	" .....	11 " .....	" .....	I	0	2	"
43	" .....	2 " .....	" .....		4	0	"
21	Boatman .....	2½ " .....	" .....		2	0	"
4	" .....	6 months...	" .....			2	"
6	" .....	3 " .....	" .....		1	0	"
75	Boatman .....	14 years ...	" .....	I	1	1	"
61	Farmer .....	3 " .....	" .....		4	1	"
5	" .....	1 " .....	" .....			2½	"
33	Boatman .....	4 " .....	" .....		2	1	"
33	" .....	1 " .....	" .....		3	2	"
22	" .....	3 " .....	" .....		2	0	"
41	" .....	4 " .....	" .....		6	0½	"
26	" .....	2 " .....	" .....		5	0	"
32	" .....	4 " .....	" .....		3	1	"
61	" .....	6 " .....	" .....	I	2	2	"
16	" .....	4 years ...	" .....	I	0	0	"
31	Labourer.....	1 " .....	" .....		2	3	"
20	" .....	3 " .....	" .....		4	0	"
4	" .....	6 months...	" .....		3	1	"
9	" .....	1 year .....	" .....		2	2	"
12	" .....	3 " .....	" .....		1	1	"
16	" .....	2 " .....	" .....		1	0	"
25	Labourer.....	10 " .....	" .....		1	0	"
65	" .....	18 " .....	Phosphates .....		3	1	"
6	" .....	6 months...	Uric acid .....		1	1	"
31	Labourer.....	2 years ...	" .....		2	0	"
31	Boatman .....	3 " .....	" .....		3	1	"
31	Farmer .....	2 " .....	" .....		4	1	"
36	Boatman .....	4 " .....	" .....		6	2	"
39	" .....	1 " .....	" .....		2	1½	"
43	" .....	6 " .....	" .....	I	1	1	"
61	" .....	10 " .....	" .....		1	1½	"
21	" .....	2 " .....	" .....		2	2	Died.
31	" .....	2 " .....	" .....		1	0	Recovery.
41	" .....	6 " .....	" .....	I	0	1	"
14	" .....	1 " .....	" .....		2	0½	"
16	" .....	1 " .....	" .....		3	0	"
9	" .....	2 " .....	" .....		7	1½	"
44	Labourer.....	4 " .....	" .....		4	0	"
40	Farmer .....	14 " .....	" .....	I	2	2	"
41	" .....	2 " .....	" .....		1	0	Lithotrity; recovery.
42	Boatman .....	1 " .....	" .....		2	1	Recovery.
51	" .....	6 " .....	" .....		4	1	"
18	" .....	2 " .....	" .....		6	0½	"
10	" .....	1 " .....	" .....		4	2	"
71	Boatman .....	1 " .....	" .....			2	"
11	" .....	6 months...	" .....		1	1½	"
19	" .....	2 years ...	" .....		2	1½	"
16	" .....	2 " .....	" .....	I	4	0	Died.
61	Farmer.....	2 " .....	" .....		4	1	Recovery.
43	Teacher.....	2 " .....	" .....		3	1	"
31	Shopkeeper.....	4 " .....	" .....		6	2	"
22	Boatman .....	10 " .....	" .....		1	2	"
41	" .....	11 " .....	" .....	I	6	2	Died.
61	" .....	1 " .....	" .....		4	1	Recovery.
8	" .....	1 " .....	" .....		3	2	"
19	" .....	9 months...	" .....		4	2	"
27	Boatman .....	1 year .....	" .....		3	1	"
8	" .....	2 " .....	" .....		3	2	"

Tabular Statement of 140 Cases of Urinary Calculus—*Continued.*

AGE.	OCCUPATION.	DURATION.	CHEMICAL COMPOSITION.	WEIGHT.			RESULT.
				Oz.	Dr.	Sc.	
71	Scholar.....	3 years ..	Uric acid .....		1	1	Recovery.
41	" .....	9 " ..	" .....		1	2	"
36	Boatman .....	6 " ..	" .....		1	2	"
3	" .....	3 months..	" .....		1	0	Died.
40	Labourer.....	8 " ..	" .....		3	0	Recovery.
21	Boatman .....	8 years ..	" .....		1	0	Lithotripsy; recovery.
43	" .....	4 " ..	" .....		4	1½	Recovery.
44	" .....	3 " ..	" .....		2	1	"
46	" .....	2 " ..	" .....		4	1	"
19	" .....	2 " ..	" .....		2	1½	"
21	" .....	2 " ..	" .....		5	2	"
76	Teacher .....	8 " ..	" .....		1	1	"
41	Boatman .....	9 " ..	" .....		6	1	"
24	" .....	6 " ..	" .....		3	2	"
51	" .....	6 " ..	" .....		4	1	"
9	" .....	4 " ..	" .....		1	0	"
18	" .....	4 " ..	Phosphates.....		2	0	"
24	Boatman .....	3 " ..	Uric acid .....		1	1	"
67	Farmer.....	14 " ..	" .....		3	2	"
80	Boatman .....	10 " ..	" .....	2	4	2½	"
10	" .....	3 " ..	" .....		4	2	"
19	" .....	3 " ..	" .....		2	0	"
23	Boatman .....	6 " ..	" .....		4	2	"
41	" .....	4 " ..	" .....		5	1	"
41	" .....	8 " ..	" .....		1	1	"

C.—Dr. FLEMMING CARROW'S Report on the Health of Canton for the  
Half-year ended 30th September 1879.

For the following table I am indebted to Mr. PARKHILL, the Harbour Master at this port:—

METEOROLOGICAL TABLE.

ABSTRACT from the Meteorological Table for the months of July, August, and September 1879, showing Winds, how many days different directions, with the average Force; Maximum and Minimum of Barometer and Thermometer, with average Rise and Fall by day and night; the Rainfall during each month; the highest Tide above low-water level, and the average Rise from the previous ebb, by day and night.

MONTH.	WINDS.							WEATHER.			BAROMETER.				THERMOMETER.				TIDES.	
	No. of Days N. to E.	No. of Days E. to S.	No. of Days S. to W.	No. of Days W. to N.	No. of Days Variable.	No. of Days Calm.	Average Hourly Force.	No. of Days Fog.	No. of Days Rain.	Rainfall in Inches.	DAY.		NIGHT.		DAY.	NIGHT.	DAY.	NIGHT.	DAY.	NIGHT.
											The Highest Reading and the Average Highest.	The Lowest Reading and the Average Lowest.	The Highest Reading and the Average Highest.	The Lowest Reading and the Average Lowest.	The Highest Reading and the Average Highest.	The Lowest Reading and the Average Lowest.	The Highest Reading and the Average Highest.	The Lowest Reading and the Average Lowest.	The Highest Tide and the Average Highest.	The Lowest Tide and the Average Lowest.
1879.							miles				inches.	inches.	inches.	inches.	F.	F.	F.	F.	Ft. in.	Ft. in.
July .....	...	17	7	3	4	...	3.5	...	9	8.8	29.98 29.85	29.68 29.80	29.98 29.83	29.68 29.81	94° 88°	76° 82°	92° 84°	76° 80°	10 2 4 5	8 5 3 6
August...	2	6	21	...	2	...	4.4	...	14	8.9	30.10 29.90	29.56 29.83	30.03 29.88	29.56 29.84	93° 89°	77° 83°	89° 84°	74° 83°	9 6 4 9	8 6 4 7
Sept. ....	10	12	3	1	4	...	3.1	...	14	6.6	30.05 29.90	29.67 29.85	30.02 29.90	29.65 29.87	92° 62°	73° 81°	85° 82°	73° 81°	10 0 4 0	10 0 5 0

REMARKS.—Rain fell on 15 days, measuring 3.9 inches, in July 1878. Rain fell on 23 days, measuring 11.9 inches, in August 1878. Rain fell on 7 days, measuring 2 inches, in September 1878.

During the spring months small-pox of a confluent form was very prevalent among the Chinese. Two villages on the island of Honam, opposite Canton city, were almost depopulated by it.

A very severe form of continued fever was noticed during the summer, and it was so grave that the native physicians called it cholera. They made this mistake, however, through the fact that they mistook symptoms of intestinal catarrh, which accompanied the fever, for the more serious intestinal troubles which characterise cholera. At the M.M.S. Hospital we have had much trouble with this form of fever. After patients have been operated on for calculi, or after tumours have been removed, this fever has delayed the recovery in many cases for 10 days or two weeks. It has given way in most cases to quinine, but while it did last, it was very severe and very weakening in its effects.

Later, during the months of August and September, a peculiar form of remittent fever made its appearance amongst both Chinese and foreigners. With the latter it was observed more particularly during convalescence from other diseases, such as acute diarrhoea, dysentery, etc., but especially amongst parturient females. Almost every lying-in woman was attacked by it. As observed by me, it began without any marked chill or fever, but with nausea and

severe cephalalgia. Twenty-four hours after these two symptoms appeared, the entire body was suffused with a slight flush, the pulse and temperature at no time being much above the normal standard. This was soon followed by a profuse perspiration, so copious as to wet the bedding and clothes of the patient. After this stage first began, it recurred at intervals of four hours, but unaccompanied by the flush, nausea or headache. This soon reduced the patient very much in strength. Quinine seemed to have no effect either in large or small doses, and in one case I thought it advisable to discontinue its use after having had the patient cinchonised for seven days. I then used dialysed iron and quassia, and I own I was very much surprised to notice a marked improvement at once. After continuing this treatment for a few days, the patient was so far recovered as to leave her bed.

I have had to treat four cases of acute diarrhoea, two cases of congestion of the liver, four cases of dysentery, and two cases of syphilitic ophthalmia as the more important diseases.

Beside these cases, I have had a patient who had a large abscess of the liver, from whom I took several ounces of pus with the aspirator. He was a member of the Catholic Mission, and had been reduced in health by insufficient food and a long residence in a low, damp, malarial district. I found the spleen very much enlarged, and he was also suffering from pulmonary tuberculosis at the time of operating. From these causes and the severity of his disease he made but a slow recovery.

I may say here that I have found much good to result from the use of suppositories of iodoform in the treatment of dysentery. I think it worth a trial. They make up nicely with cocoa butter, and I have used them to contain 4 grains of the drug, one inserted every four hours.

The death of my predecessor, the late Dr. Wong, was caused by carbuncle, the seat of which was at the back of the neck. I operated upon it twice, four incisions being made through the hardened integument, and extending down through the underlying muscles, at the first operation. These incisions closed four hours after they were made, and it seemed impossible to establish a free discharge and a thorough separation of the diseased part. I again operated, feeling that unless I brought about these conditions the disease would prove fatal. It was now very large, extending down the back as far as the ends of the scapulæ, and reaching to the crown of the head above. This time I made 23 incisions, but the diseased part would not suppurate or slough. The swelling now began to extend to the front of the neck and interfered very materially with respiration. The oppression about the upper part of the trachea was so alarming as to make me think that I should be compelled to perform tracheotomy. However, after I left him at noon I saw that the disease would soon be fatal, and, intending to return soon, I took my leave. While I was absent, some officious person gave him about 8 oz. of Chinese wine, an hour after taking which an acute diarrhoea began, and he lived but 12 hours longer. I was with him the two or three hours before he died, and I may say that his suffering was intense, and that this dreadful disease, accompanied by the worst imaginable odour, and that so close to his nose, was awful to look on. His life had been a most useful and active one, and he had practised his profession for nearly 20 years at this place.

The summer season just passed has been exceptionally free from the ordinary complaints which we naturally expect in this climate. We have had as yet no cases of dengue, and are hoping that as the north wind has begun to blow, we may avoid it altogether this season.

I have to report five births, three males and two females (one a case of twins, and one premature birth at the 6th month—child lived  $2\frac{1}{2}$  hours); no deaths.

*D.*—Dr. MANSON'S Report on the Health of Amoy during the Year  
ended 30th September 1879.

DURING the year nine foreigners have died in Amoy, four during the six months ended 31st March, and five during the six months ended 30th September.

The causes of death were as follows:—

1. Diphtheria, a child . . . . .	Resident.
2. Phthisis . . . . .	Non-resident.
3. Dysentery and liver abscess . . . . .	do.
4. Cerebral apoplexy . . . . .	do.
5. Infantile diarrhoea . . . . .	Resident.
6. Cirrhosis of liver . . . . .	do.
7. Marasmus (specific), a child . . . . .	do.
8. Abdominal tumour . . . . .	Non-resident.
9. Typhoid fever . . . . .	do.

The fatal case of diphtheria was the first of that disease I had seen in a foreigner in China. A second case occurred soon after the first, but fortunately it ran a mild course to complete recovery. I have seen very little of this disease among Chinese, but I am assured by intelligent natives that, though rare, it is known and dreaded.

Typhoid fever of *local origin* is another disease I met with for the first time in Amoy last winter. There was a small circumscribed epidemic on Kulangsu, and about Christmas time a foreigner, a Portuguese, was attacked. He recovered, but there could be no doubt about the diagnosis. Quite lately I attended a Chinaman for this disease. The case terminated fatally from perforation and peritonitis.

As this case was of local origin also, we may now be sure that enteric fever has established itself in Amoy, and that the immunity we so long enjoyed is at an end.

During the months of March and April several children were attacked by a febrile disease, characterised by high temperature and bronchial catarrh, but without eruption. Several of the cases were severe, but recovered after illnesses of from 7 to 10 days duration. The winter epidemic of small-pox was this year unusually extensive. The disease, however, was of a mild type, and all the foreigners attacked, nine in number, recovered. It is interesting to watch the regularity with which this annual epidemic recurs, and to mark how completely the circumstances which lead to its spread would be controlled by the sanitary authorities in civilised countries. There are three circumstances which from long observation I conclude mainly determines these winter epidemics:—

- 1.—The winter is the season selected by the native faculty to practise inoculation.
- 2.—At this season the poor redeem their winter clothes from the pawnshop, where they have lain since the spring, and have undoubtedly in many instances been in contact with the dirty garments of small-pox patients of the previous winter.



Something analogous occurs in England, where small-pox frequently breaks out in paper factories amongst the rag-sorters, introduced, as it appears, by the rags imported from abroad.

3.—The crowding and uncleanness incident to the cold weather.

The most important of these, I am convinced, is the inoculation. This is practised in two ways. The most usual, as is well known, is the introduction of powdered small-pox pustule crust into the nostril of the child. Another equally efficacious, but only in vogue amongst the wealthy, is the employment as wet nurse of a woman who has already nursed a child with small-pox. Very high wages are paid to those who lend themselves out for this purpose, the wage being paid, however, only on the recovery after successful inoculation of the child.

The case of liver abscess and dysentery was operated on, but only with temporary benefit. A postmortem examination showed that the abscess was multiple, many smaller secondary abscesses surrounding the larger sac which had been aspirated.

It is possible that earlier interference might have led to a better result, as the large primary abscess, and not the dysenteric ulcerations, may have been the source of the others in its neighbourhood. The more I see of abscess of the liver, the more I am convinced of the necessity for aspiration as soon as a diagnosis is arrived at, and a guess can be made at the probable situation of the pus.

The summer has been short and mild. There have been as usual several cases of diarrhoea amongst children, but there has never been a suspicion of cholera. Several cases of malarial fever have been imported from Tamsui, but I have met with none of local origin amongst foreigners, nor have the Chinese suffered as much as usual from fevers this year.

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*E.*—Dr. MYERS'S Report on the Sanitary Condition of Wênchow for the Year ended 31st March 1879.

IN my previous report \* I have described at length the main features of the port from a sanitary point of view; but little, therefore, remains for me to detail when writing about so small a foreign community as that resident here. I would, before going further, mention that the latitude of the city should read thus: lat.  $28^{\circ} 1' 30''$  N., the longitude previously printed being correct.

There was a visitation of cholera in August 1878, during which two Europeans were attacked, one fatally. The first case took place on board H.M.S. *Nassau*, and I was requested by my friend Dr. GRAHAM, R.N., to see it with him.

Briefly, I may state that most of the remedies usually adopted were tried, but that the ultimate result seemed to be most influenced by resort to dry heat. This we accomplished in the manner carried out by Captain COCKER, of the *Fei-Hoo*, viz., placing the patient between the boilers. He was thus kept in a temperature of about  $120^{\circ}$ , and allowed to drink freely of iced water. Reaction soon set in, and when the ship went to sea next morning the man was rapidly convalescing.

The second and fatal case was at first much less formidable in appearance, but as it occurred in the person of a lady, nine days after her confinement, to which disadvantage were added certain other unfavourable conditions, the result was not so unexpected as would have been otherwise the case.

The epidemic did not last long, nor did the Chinese public generally appear to suffer to the same extent as in the previous year, though the utter absence of all treatment—in the case of natives—undoubtedly tended, on this occasion as on last, to swell the mortality rate.

A second death took place during the year in an imported case. The patient was brought to Wênchow in the last stages of exhaustion from miasmatic toxæmia, and never rallied. She was stated to have been living in a miserable house, surrounded by ditches and drains, in an inland city, where good food was rarely procurable. During the last month of her illness she voided large quantities of biliary sediment. The organs (with the exception of the spleen, which was remarkably atrophied, being scarcely larger than a very small hen's egg) were normal.

The health of the foreign community generally has been very good, and quite in keeping with what one would expect from such excellent climatic conditions as usually obtain at this port. Two births took place. One child, however, was still-born. The labour in this case, though most gravely complicated and protracted, presented nothing worthy of further special reference. The mother made a rapid and complete recovery.

It now only remains for me to pass on to the last section of this report—the meteorological.

\* Customs *Medical Reports*, xv, 38.

ABSTRACT of METEOROLOGICAL OBSERVATIONS taken at WENCHOW from 19th April 1878  
to 31st March 1879.

DATE.	BAROMETER.		THERMOMETERS.				HYGROMETER.						SELF-REGISTERING THERMOMETERS.				RAIN IN 24 HOURS.
			Dry Bulb.		Wet Bulb.		Temperature of Dew-Point computed.		Elastic Force of Vapour.		Humidity, 0—1.		Maximum in Air.		Minimum in Air.		
	9.30 A.M.	3.30 P.M.	9.30 A.M.	3.30 P.M.	9.30 A.M.	3.30 P.M.	9.30 A.M.	3.30 P.M.	9.30 A.M.	3.30 P.M.	9.30 A.M.	3.30 P.M.	9.30 A.M.	3.30 P.M.	9.30 A.M.	3.30 P.M.	
1878.	Inches.	Inches.	° F.	° F.	° F.	° F.	° F.	° F.					° F.	° F.	° F.	° F.	Inches.
APRIL:—																	
Max. ....			69.	70.	68.	68.5	67.2	67.30	.666	.716	.969	.976	75.		70.5		1.
Mean ....			64.4	63.6	60.8	62.6	61.37	60.72	.551	.542	.899	.908	65.3		56.1		.3
Min. ....			58.	58.	57.	55.	55.1	55.4	.446	.439	.683	.766	58.		53.		.000
MAY:—																	
Max. ....			87.	86.	80.5	79.	76.6	84.8	.862	1.195	.969	.986	88.5		80.		.8
Mean ....			76.5	75.8	72.6	71.8	70.61	71.24	.754	.825	.832	.856	79.1		69.8		.2
Min. ....			66.	68.	64	62.	62.8	60.8	.572	.533	.710	.716	70.7		63.		.000
JUNE:—																	
Max. ....	No barometer.	No barometer.	89.	88.	82.	83.	80.0	80.8	1.044	1.044	.945	.946	89.1		82.2		1.4
Mean ....			79.9	79.4	76.5	75.	76.86	73.17	.820	.809	.797	.816	81.5		75.1		.4
Min. ....			72.	71.	69.	67.	64.8	62.2	.613	.560	.577	.630	74.7		67.5		.000
JULY:—																	
Max. ....	30.02	29.98	91.	94.5	84.	88.	81.9	86.2	1.089	1.250	.778	.847	84.		85.5		.4
Mean ....	29.88	29.78	87.2	88.9	82.1	85.1	78.8	79.3	.984	1.000	.763	.734	90.2		82.		.2
Min. ....	29.56	29.62	82.5	79.	78.5	77.	74.4	74.0	.850	.837	.766	.771	84.6		76.7		.000
AUGUST:—																	
Max. ....	30.04	30.05	93.	93.	84.5	86.5	83.8	85.7	1.158	1.230	.962	.990	97.		84.7		2.8
Mean ....	29.89	29.86	87.7	84.4	81.1	80.1	76.2	76.7	.919	.928	.757	.771	88.5		79.9		.7
Min. ....	29.76	29.75	70.	70.5	69.	69.5	71.5	72.0	.689	.701	.541	.593	77.		70.		.000
SEPTEMBER:—																	
Max. ....	30.57	30.50	89.	85.	84.	81.	78.9	78.4	.987	.971	.847	.964	92.7		82.		.8
Mean ....	29.95	29.88	81.9	78.5	76.3	74.9	75.	72.4	.868	.795	.797	.816	85.1		76.2		.4
Min. ....	29.44	29.30	73.	72.	68.	67.	63.8	63.0	.592	.576	.710	.642	74.2		68.		.000
OCTOBER:—																	
Max. ....	30.38	30.34	84.	84.	79.5	77.	76.35	74.6	.906	.842	.803	.878	92.		81.5		.6
Mean ....	30.18	30.22	72.4	71.57	68.	67.69	56.84	60.21	.442	.521	.397	.447	75.77		65.9		.4
Min. ....	29.99	29.98	59.	59.	49.	52.	40.	45.7	.246	.307	.364	.405	60.5		51.5		.2
NOVEMBER:—																	
Max. ....	30.46	30.45	77.	70.	71.	65.	66.8	61.0	.657	.536	.696	.731	79.		69.		1.4
Mean ....	30.30	30.30	62.8	62.	57.26	56.	55.50	50.6	.441	.368	.670	.657	66.3		55.		.567
Min. ....	30.15	30.15	55.	56.	48.	49.	45.0	48.0	.299	.335	.690	.716	61.		45.		.000
DECEMBER:—																	
Max. ....	30.52	30.52	74.	72.	67.	67.	62.1	63.0	.557	.576	.663	.734	75.		62.		1.6
Mean ....	30.31	30.29	57.4	53.4	48.7	48.4	44.0	45.2	.288	.301	.608	.635	57.9		45.6		.63
Min. ....	30.05	30.04	40.	38.	35.	31.	28.5	21.2	.153	.109	.616	.475	42.		28.		.000
1879.																	
JANUARY:—																	
Max. ....	30.54	30.53	67.	57.	62.	55.	58.0	53.2	.482	.406	.740	.871	68.		52.5		1.7
Mean ....	30.20	30.18	49.9	50.5	46.	43.4	38.2	29.2	.231	.159	.641	.843	54.3		41.		.284
Min. ....	30.14	30.04	37.	36.	34	34	29.8	31.0	.163	.173	.728	.816	42.		30.		.000
FEBRUARY:—																	
Max. ....	30.46	30.46	70.	64.	63.	63.	57.4	62.1	.472	.558	.630	.919	73.		57.5		—
Mean ....	30.24	30.22	56.8	52.1	51.7	49.8	46.6	47.5	.318	.329	.620	.843	55.7		44.6		—
Min. ....	29.88	29.83	38.5	42.	34	38.	27.0	33.2	.143	.200	.611	.749	45.		33.		—
MARCH:—																	
Max. ....	30.50	30.44	70.	68.	66.	62.	62.8	55.4	.572	.439	.780	.715	74.		61.		2.5
Mean ....	30.19	30.17	55.3	51.6	51.3	47.8	47.3	44.0	.326	.288	.744	.680	58.47		46.2		.6
Min. ....	29.80	29.84	42.	45.	38.5	41.	28.0	36.2	.149	.214	.558	.640	45.		38.		.000

Readings from this instrument taken once only in 24 hours.

Readings from this instrument taken once only in 24 hours.

MEAN ABSTRACT of READINGS taken during period from April 1877 to February 1878,  
and that from April 1878 to February 1879 inclusive.

	BAROMETER.		THERMOMETERS.						HYGROMETER.						SELF-REGISTERING THERMOMETERS.			
			Dry Bulb.		Wet Bulb.				Temperature of Dew-point computed.		Elastic Force of Vapour.		Humidity, 0—1.		Maximum in Air.		Minimum in Air.	
	9.30 A.M.	3.30 P.M.	9.30 A.M.	3.30 P.M.	9.30 A.M.	3.30 P.M.	9.30 A.M.	3.30 P.M.	9.30 A.M.	3.30 P.M.	9.30 A.M.	3.30 P.M.	9.30 A.M.	3.30 P.M.	9.30 A.M.	3.30 P.M.	9.30 A.M.	3.30 P.M.
Highest point attained by any instrument in each period, viz. :—	<i>Inch.</i>	<i>Inch.</i>	<i>° F.</i>	<i>° F.</i>	<i>° F.</i>	<i>° F.</i>	<i>° F.</i>	<i>° F.</i>							<i>° F.</i>	<i>° F.</i>	<i>° F.</i>	<i>° F.</i>
9 months of 1877 and 2 of 1878...	30.57	30.50	88.	91.	82.	85.	79.9	82.	1.222	1.092	.992	.942	94.5	...	88.	...	...	...
9 " " 1878 and 2 of 1879...	30.62	30.53	93.	94.	84.5	88.	83.8	86.2	1.158	1.250	.987	.990	97.*	...	85.	...	...	...
From April 1877 to February 1878 (inclusive):—																		
The mean max. ....	30.28	30.23	74.2	78.	70.2	73.3	68.1	70.1	.720	.762	.917	.852	81.8	...	70.6	...	...	...
" " mean ....	30.09	30.06	65.5	68.1	62.9	64.8	60.2	61.9	.609	.601	.832	.798	69.6	...	61.8	...	...	...
" " min. ....	29.87	29.79	57.	58.9	54.5	55.2	51.8	53.5	.456	.474	.764	.695	60.9	...	53.4	...	...	...
" " range ....	.41	.44	17.2	19.1	15.7	18.1	10.3	16.6	.264	.288	.153	.157	20.9	...	17.2	...	...	...
From April 1878 to February 1879 (inclusive):—																		
The mean max. ....	30.37	30.35	80.	78.5	77.	67.5	71.7	72.4	.807	.848	.818	.893	83.	...	73.4	...	...	...
" " mean ....	30.15	30.08	70.2	69.	65.6	65.	61.8	60.6	.565	.598	.707	.757	72.7	...	62.7	...	...	...
" " min. ....	29.87	29.84	59.2	59.	55.	54.7	51.2	55.9	.436	.434	.636	.662	62.7	...	53.8	...	...	...
" " range ....	.50	.49	20.8	19.5	22.	12.8	20.5	16.5	.371	.414	.182	.231	20.3	...	19.6	...	...	...

\* 1 day.

*N.B.*—As during the greater part of 1877 there was no gauge available at the port, the rainfall has been omitted from the above table. It must also be recollected that during the first three months of the second period the barometer was not kept, hence the averages given for this period, and relating to that instrument, are only for eight months, and must therefore be taken for what they are worth, as indicating the mean atmospheric pressure of the second epoch when contrasted with the preceding one.

The Customs, to whom I lent my instruments during the previous year, ceased to take observations after February 1878, returning the instruments to me. I thereupon continued the readings myself, with the exception of those from the winds and clouds; nor were these obtainable from the Customs, hence this year's record is in this respect less complete than that of last.

In order to prevent misunderstanding, I may mention that the Assistant-in-Charge must have been misinformed when he speaks of the instruments as being "indifferent" (*see Trade Reports for 1877*). I can only say that they were obtained from one of the best makers at home, and have always been found accurate when compared with those standards I have from time to time been able to get hold of. I have reason to believe that the fact of there being a "correction for index error" supplied with the thermometers led to the supposition of their imperfection. I need scarcely remind those familiar with meteorological observation that this

correction is necessary to all instruments, but that this does not detract from the confidence that they merit.

As this is the last report I shall be in a position to write on Wênchow, I have thought that an abstract of the general tables, contrasting the period from April 1877 to February 1878 with that from April 1878 to February 1879 might chance to be useful or interesting. It will be seen that I have omitted March in both years; but this I have been obliged to do, as the instruments were changing hands and situation at that time, and so the observations were temporarily interrupted. I have only to add that the dew-point, elastic force of vapour, and humidity are computed from the Greenwich factors published in 1857; that the instruments were placed under shade in the open air within the city; that they faced south; and that the rain-gauge was placed 4 feet above the ground.

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*F.*—Dr. RINGER's Report on the Health of Tamsui and Kelung for the Year ended 30th September 1879.

DURING the last 12 months rain has fallen in Tamsui on 146 days in all.

The summer has been prolonged, though not excessively hot. There has been, as usual here, a considerable amount of malarious fever—almost all the residents having suffered more or less from the intermittent or remittent form.

Four deaths have to be recorded. The first two happened in Kelung within a few days of each other; both patients were advanced in life, and had passed many years in the East. The first, which occurred in November 1878, was produced by exhaustion following repeated attacks of fever and diarrhœa. The second was a case of failure of the heart's action, after long and obstinate vomiting, accompanied by severe nervous prostration, apparently produced by shock at the death of patient No. 1, upon whom he attended. The third death took place at Coal Harbour towards the end of January 1879. The patient, who was a man of middle age, had for some months previously suffered from locomotor ataxy, and was latterly quite unable to walk. Some hours previous to death, coma set in, and the patient expired quietly without convulsions.

The fourth was a case of sudden death in the person of a Portuguese, who fell down in his room and died in about half an hour. A postmortem examination showed the cause of death to have been rupture of an aneurism of the aorta. The heart was large, flabby, and dilated, and was situated under the centre of the sternum, the apex being on a level with the sixth rib. The pericardium contained a quantity of liquid blood, and in the sac of the aneurism a clot weighing about 6 ounces was found. On examination of the sac, a small ulcerated opening, sufficiently large to admit an ordinary quill pen, was discovered at the base communicating with the pericardium, which thus became distended with blood, thereby arresting the action of the heart.

G.—Dr. J. A. STEWART's Report on Health Conditions in Foochow.

Six years ago I made a report on the health of Foochow for one of the English insurance companies, in which I showed that the death rate of foreigners resident in Foochow was not higher than that of the healthiest districts of England. That report was based on an experience of eight years, and to-day I must confirm it. But while the mortality of Foochow is low, I will admit that there is no little sickness in it. Ladies and children specially suffer, as likewise young men who have lately arrived from Europe or America, and forget to take care of themselves.

The diseases of ladies and children are largely unavoidable, because essentially climatic. But the diseases of men are in great part not so. If men would be careful not to walk unguarded in the sun, and to eat and drink lightly, and to avoid catching chills, there would be comparatively little for the doctor to do as regards them. I may mention in point that the oldest male residents in Foochow are its healthiest, and that these in most part very sedulously guard against the sun and the temptations of the table, and the dangers of sudden atmospheric changes. I consider that if a man is rationally careful of himself in Foochow, he has more chance of living long than in England, and with, perhaps, fewer bodily ailments. Possibly I may be sanguine, but yet I am sure I do not speak without my book.

When I say that the diseases of ladies and children are very much unavoidable, I mean that they are chiefly affections of the nervous system, due to the effect of climate, which certainly does act on them as it does not on men. This is true with regard to ladies especially, and to children under two years of age. To children above two years of age it does not hold so true. Indeed, one anxious to discuss the point might plausibly argue that it does not hold at all; but still I consider my main statement incontrovertible.

I will now mention the diseases which appear to me to particularly affect Foochow. I need not go over the whole list, but those which give most trouble, and I shall omit the neurotic affections of ladies and children, which require a paper to themselves, and which I had better afford in a future number of the Medical Reports.

The diseases which give most trouble in Foochow, excepting the specific class, which I omit here, are those grouped together as malarial, typhoid, and rheumatic, along with proctitis and cholera. I would add diarrhoea and dysentery, only it is seldom I have met with diarrhoea separated from or not maintained by some form of proctitis; while I have known, say, five cases, of dysentery proper, that is, pure ileo-colitis. I would add, too, hepatitis were it not that I have met with but three cases of that, two of which were fatal, and the other not so, though the liver extended half-way between the umbilicus and pubes. Jaundice is not uncommon, while what is called "liver" is what every man is certain he has as often as he is dyspeptic, or has any pain on the right side, or even on the left. The word "liver" is a great invention; it explains so many

things. It is also by every token something to have. It is strange that if one says to his patient you have dyspepsia, or such and such an affection of the stomach, he smiles as if he were told of but a trifle; but if one is more judicious, though less honest, and mentions "liver," the patient takes the alarm.

The malarial species of disease varies from pernicious and remittent fevers down to ague in all its manifestations. I am glad to say that pernicious fever, or call it congestive fever, is rare; for separate from cholera alone, I do not know a disease, not organic, which so rapidly, and with greater horror to the spectator, brings the patient within threat of instant dissolution. I have known a gentleman eat a hearty breakfast, go about his work, begin to complain of being chilly, and in an hour afterwards be comatose; but my most distressing case, owing to the pain she was in at first, was that of a lady who, up to that time, had scarcely had half a day's illness, putting all her illnesses together. About 2 P.M. she was seized with coldness and shivering conjointly with pains in all her limbs. At 3 P.M., when I saw her, she was lying in front of a large fire, shrivelled as it were into herself, and shrieking with cold, and an intolerable agony in every bone. At 3.30 P.M. she presented one dull leaden colour, and her shrieks of pain were, if possible, more piercing than ever. She was thirsty with a thirst nothing could slake. At 4 P.M. she was comatose, and next to pulseless. Thus she remained till about 5 P.M., when a perceptible warmth set in. At 7 P.M. she was in a high state of fever. At 8 A.M. the fever abated, and about an hour after she awoke out of her coma, asking where was she, and what was it all. This lady made a perfect recovery in three days more, but the gentleman I have mentioned was never the same healthy man upon his recovery. Too much writing, or a little exposure to the sun, "knocked him over," as he remarked.

When I came to Foochow, remittent fever was unknown among the foreign merchants dwelling in it; at least I knew of no cases among my own patients nor those of Dr. BEAUMONT. We used to say then, "the nearest instance of remittent we have had is that of the Rev. Mr. ———, who went to Amoy, and took it there, and succumbed to it." My attention was first attracted to the occurrence of remittent in Foochow some seven years ago, when a missionary friend came home from a tour up country with it. The following year the same man had it after another tour in the country; after which he had to restrict his tours, and finally go home. About three years back I had my first case of remittent among the mercantile community, the year before last I had another missionary case, and last year there were three cases. The type of remittent has been a very low one in each case, what might be called typhoid remittent; but happily till last year it caused no deaths. Last year, however, one case became complicated with extensive pneumonia and sank under it.

Typhus fever used to be rather frequent, and especially in one missionary compound, whose wells were sunk below the level of some adjoining filthy buildings, which are now in a better state. Of late, typhus has given way to remittent. My last case of typhus occurred five years ago. Some of the cases of typhus caused no anxiety, though most part were within the reach of danger. There was only one instance of death from typhus, and that was in the case of one who arrived from Hongkong labouring under it, and who survived his arrival but five days, three of which he passed already beyond hope.



With the exception of ague, if I should except that, nothing is more common among us than rheumatism. If the paddy fields of Foochow explain the occurrence of ague, its very damp and variable atmosphere returns the required answer for the rheumatism.

The kind of rheumatism prevalent is the chronic. I have seen but three cases of rheumatic fever, one of which was accompanied with endocarditis. This rheumatism has hitherto chiefly affected the right side, giving to the patient his certainty that he has "liver"; next in frequency it attacks the left side, making the patient convinced he has heart disease; next the lumbar and hypogastric regions. A mild form of rheumatic gout is not entirely absent.

One feature about rheumatism has struck me here, and that is that it often supervenes upon an attack of ague, and occasionally alternates with it, though not in any marked degree. When sprains have occurred, or contused wounds, I am now from old acquaintance in the habit of looking out for rheumatism acceding to the sprains or contused wounds, after these have been pronounced whole. It would seem as if rheumatism were in the air, and waiting to seize hold of any person or portion of a person that has been brought below par.

Three cases of rheumatism of the sphincter ani and the adjoining parts of the perinæum have come under my notice, and I scarcely have witnessed more distressing cases. They took place in men subject to mild attacks of ague; but, indeed, the longer I watch, the more I am inclined to relate ague and rheumatism to one another. Not that I mean to say they are the same, but only too closely helping each other. Possibly the aguish attacks sweep the path clean for the rheumatic, and *vice versâ*.

Cholera is endemic in Foochow, and sporadic cases occur every summer. It seldom disturbs the foreign community, although I must allow we have had two deaths from it, while three more deaths from it came as near happening as possible. Of five seizures, and we have had no more, two terminated fatally; this may show the virulence of our cholera, if I may so speak.

At different periods, but on the whole supposed to average every 10 or 11 years, the cholera becomes an epidemic. The last epidemic was in 1867, and the one before that in 1864. Both destroyed a great number of Chinese, allowing for every exaggeration, and both carried off one foreign victim. Each victim, though, had been previously ailing, and I may add that the constitution of one was much broken.

The epidemic of 1867 was more virulent than that of 1864—that is, if it did not kill more, it killed in less time. A man, apparently well, would enter a shop to make some purchase; he would say, "I feel ill," go into the street, commence stumbling, and fall, and die. You might be riding along a road; all at once you would observe that people ahead of you were alarmed, and running to one side, and then you would see a man trying, with every horror in his face, to raise himself from his knees; next he was over on his side a corpse. There was no diarrhœa, no vomiting; no time seemed to be given for either in the height of the epidemic, or in its worst seizures; people were struck down as with a blow.

I do not know what could be more demoralising than the epidemic of 1867. A person received no warning, and was certain of himself from moment to moment only. But besides this specially quickly fatal phenomenon, there was another which struck me much. The epidemic took a circular course, almost in the shape of the letter S. It did not run along the crowded

thoroughfares simply, but sometimes that, sometimes diagonally to them, according as they harmonised or did not with its path. The course, too, was a narrow one, and quite definite. It put me in mind of what I had read of tornados in certain of the United States. As in these, the destruction is not only of small breadth, but worst towards its middle, and bounded by an abrupt edge. So in this. In the centre of the epidemic path the mortality was prodigious, but lessened and lessened outwards from the centre, till the line of non-involvement was abruptly touched. Thus a track of death and woe ran through the city, and 80 yards from its centre, maybe, there was fear and trembling, but no deathstroke. It certainly did look as if something in the air and nothing on the ground determined the course and extent of the epidemic.

From what I have seen of the two epidemics of cholera in Foochow, I am disposed to accept with suspended assent some of the recent theories about the transmission of cholera. But of this, whether right or wrong, at a more convenient season. That the final end is brought about by an increasing tonic spasm of the arterioles, I have no doubt. In this, if I may presume to judge by one case of hydrophobia which I had in Foochow, it bears a resemblance to hydrophobia. If we are to cure cholera as well as hydrophobia, our attention must be directed to alleviation of this spasm.

Not a summer passes without several cases of proctitis, aggravated sometimes by an extension of the rectal inflammation into the colon. Now, it gives rise to a diarrhoea, which may be of any degree of intensity, say from a slight looseness to one of no small danger; now, to all the characteristics of dysentery in its mildest or gravest stages.

But it is the often persistent nature of the proctitis which is the hard point, and which makes me prefer a case of true uncomplicated dysentery or ileo-colitis to most cases of proctitis, because the former is more amenable to medicine than the latter, and because, too, when the former is subdued, care concerning it may almost invariably cease, while in the latter, though it may appear gone to-day, it returns with very likely unabated life to-morrow. Thus, a case of true uncomplicated dysentery may be supposed to be within one's power of extinction in 14 days; but a case of proctitis may run on for years, baffling every attempt against it, and every variety of skill, and making the patient lose faith in doctors and medicine—in fact, think they are the cause of all his illness.

The persistency of the proctitis appears to me to increase as it approaches the inner edge of the sphincter ani, just as if the contractions of the sphincter kept up a constant irritation, which prevents healing. I have frequently thought, and I believe on good enough grounds, that but for the sphincter, proctitis would present little difficulty.

I would mention in connexion with proctitis a disease which attacks children here, and which I do not recollect having noticed anywhere. It generally attacks children from six months to five years of age, but I have had a case where the patient was as old as ten.

There is most generally no warning given of this disease, and the child, while yet laughing and full of play, has one loose stool, speedily followed by another still looser, and that then by another no better, but the reverse. Soon the stools become mixed with blood and mucus, and in the end there is nothing passing except a little blood and mucus, while the straining and desire to evacuate which has already set in turns incessant. The stools may amount to 10 or 12 in the 24 hours, though I have known them to rise to 20, and in one case they reached

to 18 in four hours. The child as a rule exhibits no constitutional disturbance in proportion to the amount and character of the stools. Indeed, it will laugh and seek to play all through, when not sitting; and I make this a diagnostic mark. I have met with no exception to this, save in the one instance where the stools amounted to 18 in the four hours. There a great and dangerous sinking came on till the infant—for it was only six months old—appeared to have but a few minutes of life before it; and yet it proved my best case, for next day it was quite gay and convalescent.

When such symptoms as I have described have displayed themselves, if the physician disclose the opening of the rectum, he will find within the sphincter, and more externally, a deep, clean cut, or else large denudation, or else angry-looking ulcer or large slough. I had a case in which the whole of the external meatus was one ashy slough by the time I could get to make an examination. Till the external meatus has commenced to return to the healthy state, the evacuations, straining, etc., will not cease; the moment that is instituted these abate. Of my eight cases, the healing process was commenced, and it advanced apace after, in one—the infant—within 18 hours of the manifestation of the disease; one convalesced in 48 hours; four in six to ten days time; one in five days, then followed a relapse lasting over a week; one in two months.

Though I am not giving an exhaustive account of the diseases of Foochow, but only drawing attention to the most recurrent, I should not conclude without a few sentences on what I am disposed to call the Foochow ulcer, and on venereal, and one or two other complaints.

The ulcer is usually an accompaniment of the hot season, though not invariably so. It begins seemingly of its own accord, or after a scratch, say of a mosquito bite, though some of my worst cases have followed from the tear of thorns, got while out shooting, and from falling down and getting bruised. The ulcer generally affects the leg, and especially the portion over the shin-bone; sometimes, however, the ankle. The patient thinks nothing of it at first, and thus valuable time is lost. He says, "Oh, it will be all right soon." By-and-by, however, the redness or inflammation all round it, increasing fast, joined to the pain set up, begin to alarm him. Now the physician is sent for, and he sees a gangrenous-looking ulcer, with possibly an angry erysipelatous blush all round it, and extending, maybe, from the knee to the foot. A case of six weeks or two months duration at the least he recognises as on his hands, during which the patience of the patient, if not his own, will be severely tried.

I have not met with any of the worst types of venereal in Foochow, unless the disease happened to be contracted at the anchorage or one of the outside ports. I have met with sloughing phagedæna of the privates of the worst kind, and destruction of the velum palati, pillars of the fauces, scalp, face, and gastrocnemius through the action of the specific sore; but these were imported cases. I have not met with any such thing originating *de novo* in Foochow. Whether this be accidental or not, I will not argue upon, because at present I am concerned with a simple statement of facts. It would seem to me, however, as if there were more than accident here, and that the Foochow type of venereal were relatively mild.

Touching conclusions to be prognosed from the primary sore, one would make a mistake if he anticipated no harm from the absence of hardness. I have known very evil consequences

to arise from neglect of what seemed a slight superficial chap. The old rule about the Hunterian chancre alone being harmful fails completely in China.

I have had some cases of diphtheria; one fatal in 20 hours from the time I first saw it. The rest recovered.

Croup not seldom assumes alarming symptoms, but readily gives way to remedies.

Bronchitis gives rise to little more than a persistent hacking cough.

Pneumonia occurs most rarely, though generally in a low form, not to be undervalued.

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H.—Dr. BRERETON'S Report on the Health of Chefoo for the Half-year ended  
30th September 1879.

FOR the following meteorological table I am indebted to Mr. JENNINGS, Harbour  
Master:—

TEMPERATURE.

	DAY.			NIGHT.		No. of Days over 90°.	No. of Days Rain.
	Max.	Min.	Average.	Max.	Min.		
April.....	80	28	54	62	30	—	2
May.....	92	41	65	68	44	2.	1
June.....	99	56	77	78	58	4	3
July.....	98	64	81	79	67	8	13
August.....	94	58	76	82	68	8	10
September.....	87	53	70	73	56	—	6

The summer season on the whole has been healthy, notwithstanding the excess of rain which has fallen to our lot during the greater part of the warm months; it, however, was not attended with that oppressive heat which was experienced at other ports. It will be seen by the accompanying meteorological table that we have had a high thermometer for a few days now and again, but we were scarcely ever without a delicious breeze, which was always most refreshing, and enabled us to bear our lot with equanimity and patience; in fact, it was frequently a matter of surprise to many when on a fine, clear, warm day they happened to interrogate the thermometer, and found it perhaps 95° or so. Considering the nature of the past summer, it is surprising we had so few cases of bronchial affections, but although we were so fortunate as regards numbers, yet we are compelled to chronicle two cases of pneumonia, an affection extremely rare here, owing, no doubt, to the dryness of the atmosphere. One case ran a mild course, but the other assumed rather alarming symptoms, the temperature running as high as 105°. The treatment comprised antim. tart. in the early stage, then tartar emetic and calomel, and lastly quinine and expectorants. Locally, poultices were applied. This case progressed most satisfactorily, and illustrated the success which attends the early administration of antimony, a line of practice I almost invariably adopt in sthenic cases, with favourable result.

The following is a list of the diseases among foreigners treated at this port from 1st April to 30th September:—

A.—GENERAL DISEASES:—

Syphilis, primary . . . . . 6 cases.  
 „ secondary . . . . . 8 „  
 Gonorrhœal rheumatism . . . . . 1 „  
 Ague . . . . . 3 „  
 Febricula . . . . . 2 „

Influenza . . . . . 1 case.  
 Scarlatina . . . . . 2 „  
 Typhoid . . . . . 1 „  
 Varicella . . . . . 1 „  
 Debility . . . . . 1 „  
 Impaired nutrition . . . . . 1 „

**B.—LOCAL DISEASES:—***Diseases of Nervous System:*

Apoplexy . . . . .	1 case.
Alcoholism . . . . .	3 "
Hysteria . . . . .	1 "
Congestion of brain . . . . .	1 "
Trifacial neuralgia . . . . .	3 "

*Diseases of Eye:*

Conjunctivitis . . . . .	1 "
Syphilitic iritis . . . . .	1 "
Hordeolum . . . . .	2 "
Trichiasis . . . . .	2 "

*Diseases of Circulatory System:*

Mitral disease . . . . .	1 "
Aneurism of aorta . . . . .	1 "

*Diseases of Respiratory System:*

Phthisis . . . . .	1 "
Pneumonia . . . . .	2 "
Hæmoptysis . . . . .	1 "
Bronchitis . . . . .	1 "

*Diseases of Digestive System:*

Alveolar abscess . . . . .	1 "
Stomatitis . . . . .	2 "
Tonsillitis . . . . .	2 "
Dyspepsia . . . . .	4 "
Constipation . . . . .	2 "
Diarrhœa . . . . .	15 "
Infantile diarrhœa . . . . .	2 "
Dysentery . . . . .	5 "
Colic . . . . .	3 "
Hepatitis, acute . . . . .	3 "
"    subacute . . . . .	2 "
Cirrhosis . . . . .	1 "
Jaundice . . . . .	1 "
Helminthiasis . . . . .	2 "
Hæmorrhoids . . . . .	2 "
Hernia . . . . .	2 "

*Diseases of Generative System:*

Gonorrhœa . . . . .	14 cases.
Gleet . . . . .	2 "
Phagedæna . . . . .	1 "
Phimosis . . . . .	1 "
Paraphimosis . . . . .	1 "
Orchitis . . . . .	2 "
Prolapse of uterus . . . . .	1 "
Retroversion . . . . .	2 "
Anteversion . . . . .	2 "
Suppressio mensium . . . . .	1 "
Menorrhagia . . . . .	3 "
Endocervicitis . . . . .	1 "
Vaginitis . . . . .	1 "

*Diseases of Urinary System:*

Bright's disease . . . . .	1 "
Cystitis . . . . .	2 "
Stricture . . . . .	2 "

*Diseases of Organs of Locomotion: .*

Periostitis . . . . .	1 "
Synovitis . . . . .	1 "

*Diseases of Cutaneous System:*

Herpes . . . . .	1 "
Eczema . . . . .	1 "
Prurigo . . . . .	1 "
Chronic indolent ulcer . . . . .	1 "
Whitlow . . . . .	5 "

*Local Injuries:*

Incised scalp . . . . .	1 "
Partial division of tendo Achillis . . . . .	1 "
Contused foot . . . . .	1 "
Sprain of wrist . . . . .	1 "

It will be remarked from this list that diseases of the digestive system comprise about one-third of the diseases treated during the last six months, and of these affections nearly a third are cases of diarrhœa; but these occurred principally among visitors and the shipping, five cases

only having taken place among the residents. They, however, all progressed more or less satisfactorily, except in two instances, where the complaint had been chronic; in these, medicine, diet, and the recumbent posture all seemed powerless to arrest the disease, which ultimately proved fatal. In each of these the body became covered with a number of purpuric spots a few days previous to death.

Two cases of gleet came under notice. One was a man aged about 25, pale and serofulous-looking, who had been treated by a variety of drugs for a period of 18 months without result. A No. 6 catheter was passed with ease till it reached the bulbous portion of the urethra, when it was grasped by a slight stricture. After this, gradual dilatation was effected for about a week, by which time all discharge had ceased. Catheterization was also used in the other case, but he remained under observation for a few days only.

We have to record five deaths—three visitors, two residents. Of the former, two were cases of advanced diarrhoea, already mentioned; the other was typhoid, which proved fatal seven days after arrival here, from perforation of the bowel. Of the latter, one was a case of cerebral apoplexy occurring in an individual who had been a hard drinker; the other was an infant, a few weeks old. The child when born was very small and puny, but thrived well for some little time, when vomiting and diarrhoea set in, to which it succumbed in a few days.

Seven cases of confinement were attended; of these, four were perfectly normal, the others were—one forceps, one breech presentation, and one adherent placenta: all did well.

A case of complete retention of urine occurred in a Chinaman, the subject of double stricture. No urine had been passed for 40 hours before applying for relief, and previous to this he passed urine merely guttatim for about two days. Hot baths were ineffectual, and a No. 1 catheter could only be got through the first stricture, which was situated a little anterior to the bulb; the second stricture, situated a little behind the other, could not be passed. After some little time, however, a whalebone filiform bougie was insinuated through both strictures, but no urine escaped; a second was then passed alongside it, but also failed in relieving the distended bladder, which was felt as a hard ball as high as the umbilicus. There was consequently little left but to puncture through the rectum; however, before resorting to this, he was given a hypodermic injection of half a grain of morphia, and all attempts at catheterization suspended for about 15 minutes, after which it was gently tried again, and again failed, a No. 2 silver instrument being used. Chloroform was then given, and as soon as complete insensibility was produced, the catheter was again tried, and this time entered the bladder, drawing off about two quarts of high-coloured urine. The quantity of chloroform required to narcotise after the injection was very small; in fact, after insensibility was produced, its use was completely suspended, the patient remaining perfectly quiet and unconscious for about seven minutes, while the instrument was being passed. After it had entered the bladder he was roused without the slightest difficulty, and returned to complete consciousness. No ill effect from the chloroform was manifest afterwards. After this the patient permitted occasional catheterization, but stoutly refused to allow further interference.

An extraordinarily severe case of injury in a native demanded treatment during the summer. The case was one of a bite from a shark, which took place when the sufferer was diving for some *bêche de mer* outside the Bluff, which is the northern boundary of Chefoo Harbour, and seldom frequented by foreigners. Chinese fishermen frequently go out in fine weather a considerable distance and dive for this article, but always previously arm themselves with a weapon wherewith to defend themselves in case of attack, knowing the risk run from the presence of these formidable monsters. It was while this Chinaman was down searching for the food

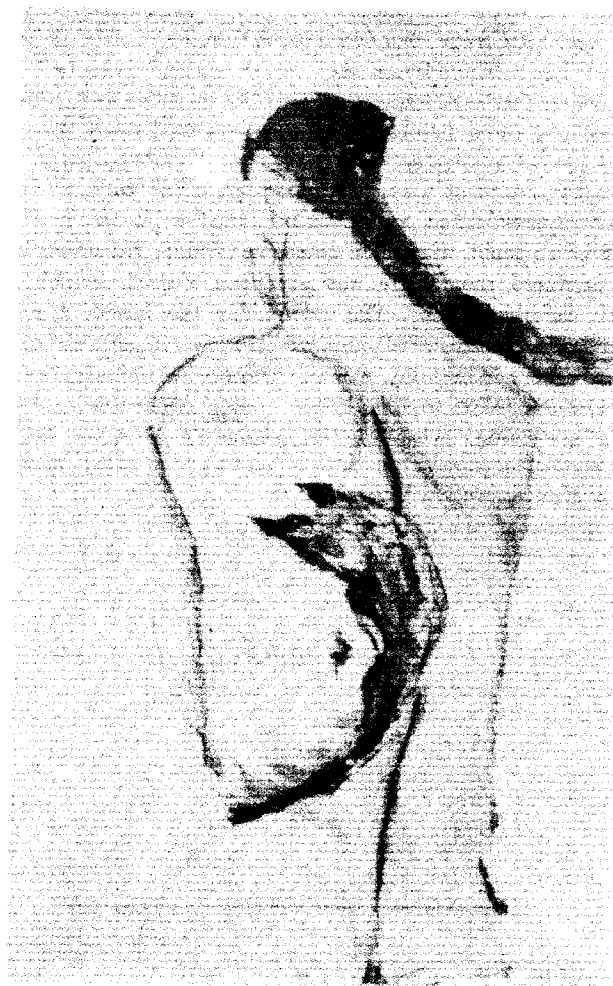
mentioned that the fish approached, and he, having unfortunately forgotten his weapon, was caught as is represented in the accompanying photograph. He, however, managed to free himself from the shark's grip, and rose to the surface, when his companions rescued him, and had him conveyed home.

It was not for two days after this that he applied for relief at the hospital. The wound then presented a most horrible aspect, being literally swarming with thousands of maggots; his general appearance was not bad; pulse good, temperature,  $101^{\circ}$ ; respirations, 20. On examining the wound more closely, it was found that all the soft parts were torn from the vertebræ and angles of ribs in the course of the injury, and presented one large solid flap. The inferior angle of the scapula was laid bare, and the rib under this broken; there was also a very free communication with the lung—in fact, when lying on his right side, the air entering the wounded lung could be heard at a considerable distance like a bellows. The lowest point of the wound penetrated almost as deep as the peritoneum. No hæmoptysis. The wound was thoroughly cleansed of the maggots by means of a syringe and forceps, and then, having applied carbolized oil, the edges of the wound were approximated by means of adhesive plaster, and bandaged. On the anterior part of the chest were 8 or 10 small triangular abrasions of skin, indicating it was the teeth in the upper jaw of the fish which produced them. He was put upon a good nourishing diet, and the wound was frequently cleansed with carbolic lotion. The second day the bowels were freely moved after a black draught. The patient progressed most satisfactorily for 10 days, appetite being good, sleeping well at night, no sweats, bowels moved every other day naturally, and the wound presenting a healthy granulating appearance. The temperature, taken in the rectum, varied from  $100^{\circ}.2$  morning and  $100^{\circ}.8$  evening to  $101^{\circ}.3$  morning and  $101^{\circ}.9$  evening: these are the extremes. After the 10 days, however, he gradually sank into a low typhoid condition, passing one or two large loose motions under him as he lay for three days, and died on the 14th day after coming to hospital.

The photograph is taken from a drawing made by a friend.

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I.—Dr. SCOTT'S Report on the Health of Swatow for the Half-year ended  
30th September 1879.

I AM indebted to the courtesy of Mr. Harbour Master RAE for the appended table of meteorological observations for the past six months. The thermometric records show a maximum heat of 98° F., but I would here observe that the observations are made in the very hottest shaded place in Swatow, and are by no means a criterion of the shaded heat in other houses in the neighbourhood.

ABSTRACT FROM METEOROLOGICAL TABLE.

MONTH.	WINDS.					MERCURIAL BAROMETER.				THERMOMETER.						RAIN AND FOG.			TIDES.	
	Number of Days N. to E.	Number of Days E. to S.	Number of Days S. to W.	Number of Days W. to N.	Number of Days Calm.	Highest by Day.	Lowest by Day.	Highest by Night.	Lowest by Night.	Highest by Day.	Lowest by Day.	Highest by Night.	Lowest by Night.	Average Wet Bulb.	Average Dry Bulb.	Number of Days Rain.	Number of Inches Rainfall.	Number of Days Fog.	Average Rise Spring Tides.	Average Rise Neap Tides.
1879.	D. h.	D. h.	D. h.	D. h.	D. h.	Inch.	Inch.	Inch.	Inch.	°	°	°	°	°	°	D. h.	Inch.	D. h.	Ft. in.	Ft. in.
April .....	12 20	9 12	0 23	0 15	6 1	30.30	29.90	30.32	29.99	87 64	78 59	66 69	3 11	4.925	4 16	6 6	5 8			
May .....	4 8	11 17	9 21	1 3	3 23	30.08	29.81	30.08	29.85	90 74	84 70	77 81	3 8	9.825	0 7	5 11	5 7			
June .....	5 0	6 12	12 12	1 8	4 16	30.07	29.80	30.04	29.90	89 74	83 58	76 80	6 15	9.975	...	6 4	5 8			
July .....	2 4	10 4	12 8	2 20	3 12	30.07	29.71	30.04	29.66	98 78	86 73	80 84	2 13	2.650	...	6 8	5 9			
August .....	2 12	8 20	13 0	4 0	2 16	30.07	29.74	30.06	29.70	98 77	90 75	77 82	2 16	2.803	0 7½	6 9	5 6			
September...	12 4	7 12	3 4	4 4	3 0	30.14	29.53	29.97	29.50	94 75	80 72	79 84	3 22	9.004	0 12	6 9	5 6			

Note.—Tides very irregular; not to be depended on, being greatly influenced by the winds.

We have reason to congratulate ourselves on having had a tolerably mild summer—very mild in comparison to the heat endured in other ports, particularly Shanghai—and on having again escaped the visitation of any serious epidemic. This season I have not seen any cases of cholera (a disease usually met in a few cases during the summer months), nor any cases of heat apoplexy, nor more than the usual amount of summer diarrhoea and intermittent fever. Some severe cases of fever and dysentery occurred among resident children, two of which were fatal. A rather curious epidemic of influenza attacked the children living on one side of the river, the other children living on the opposite side and on Double Island remaining quite unaffected thereby.

It commenced in one house, in a child 20 months old, with running at the eyes and nose, feverishness and general malaise and loss of appetite, lasting for four or five days, and ending in a sharp bronchitic attack with lessened fever, gradual resolution, and recovery in about 10 days. The second child attacked was a boy of about five years, commencing in the same way and ending with a sharp attack of spasmodic croup (*laryngismus stridulus*) of an alarming nature, followed by slight bronchitis and speedy recovery.

This disease attacked all the children living on the south side of the river, behaving in the same way in each case, and in one commencing with an attack of croup and ending hastily without the bronchitic stage. It only attacked children. I do not remember seeing anything like this occurring here before, though influenza in sporadic cases is by no means uncommon. I had under my care three cases of acute rheumatism—rheumatic fever—in the early part of the season, two occurring on board ship, in sailors who had come from the north, and another in a resident here, coming on after a severe wetting on a raw day; they all yielded quickly to the exhibition of salicine in 20-grain doses every four hours, the effect of the medicine being most marked in the case of the resident, an oldish man (48 to 50 years), very much broken down in health.

He had been ill for some days before I saw him, and all his joints were bad, particularly those of the lower limbs. He could not move in bed or feed himself, was suffering great pain, bowels constipated, sweating profusely, and a temperature of 104° F. I gave him the salicine at once in powder, and the following day the temperature was down to 102° F., and continued to fall steadily, and was normal in four days. His joints continued stiff and his feet swollen for some weeks, no doubt owing to the fact that he would get up and walk as soon as his legs would carry him. He ultimately made a good recovery.

I have noticed here of late a curious form of fever, more a continued fever than a remittent one, and it, too, I have found entirely among children. It generally commences with a rigor, or a pain in a limb or an ear, a day or two before the child lies down. Great irritation and irritability of temper, loss of appetite, and disinclination to do anything, with occasional vomiting, are the first symptoms. Headache comes on about the third day, with congestion of the eyes and flushing of the face; then large red patches appear on any part of the body—the face, limbs, or trunk—patches sometimes like urticaria, and more frequently simply red unraised patches, which come out all at once, and remain out a few hours and disappear. The next symptom may be convulsions or delirium, or first one and then the other (I have only met with one case of severe convulsions coming on the same day the red patches had appeared, but always look for them now in excitable children in these cases), accompanied with high temperature, 104° or 105° F., and pulse of 120 or 140. The fever usually intermits some time for a couple of hours during the 24 hours. The intermittent character of the fever continues for some days, accompanied with chest complications first, and then an abatement of the fever as the chest symptoms subside, often followed by a return of the fever, and an unhealthy-looking diarrhoea for a few days. I have been fortunate in not losing any of these cases, and find grey powder and quinine the best remedies to trust to—of course, treating the complications as they arise. The fever usually runs a course of from 12 to 20 days before convalescence can be said to be fully established. The following case, occurring last season, is a tolerably illustrative one:—

G. H., aged seven years, female, complained of pain in the left ear on Saturday afternoon, but was lively and played about till the next day, when she was languid and lay about most of the day. On Monday her face and arms were covered with red unraised patches about the size of a dollar. Skin very hot and eyes heavy and congested. She was given a dose of castor oil by her mother, and the patches disappeared the same

evening. *Tuesday*.—Lying about, very cross, very hot, and refusing to eat; purged by the oil of yesterday. Some dull red patches appeared on the forehead, and towards evening the whole body was covered with this eruption, which alarmed her parents, and I was sent for the next morning. I found her in bed, complaining of great headache, her eyes swollen, and opened with difficulty, and her face covered with dull red, almost brown, coloured patches. She had been wandering in her mind during the night, continually tossing about the bed and calling for water, but was quite reasonable when I saw her. At first sight I thought of measles, but I never saw such a measly eruption, and the history brought to my mind the previous cases of this complaint which I had seen. The temperature was  $103^{\circ}.2$  F., pulse 140, respirations 20 in the minute, and the chest quite clear and free from disease. The skin was burning hot, and the bowels were not open since the dose of castor oil. I ordered the following mixture:  $\mathcal{R}$  Spt. etheris nitrosi and liq. ammon. acet.  $\mathring{a}\mathring{a}$   $\mathfrak{z}$ ij ss., viii. antimon.  $\mathfrak{z}$ ij, syrapi  $\mathfrak{z}$  ss., aquam ad  $\mathfrak{z}$ ij;  $\mathfrak{z}$ ij 3tis horis. After a few doses she began to perspire freely, and her head was relieved, but the general symptoms remained the same. *Thursday*.—Temperature  $102^{\circ}.4$  F., pulse 138, respirations 24; bowels constipated, eruption general, tongue white and furred. *Friday*.—Temperature  $102^{\circ}.8$  F., pulse 138, respirations 20; tongue white, with red tip and edges, eruption general, bowels unmoved; ordered powders of quinine gr. xx, hydrarg. c. creta gr. xij, fiant xij; one to be taken night and morning. *Saturday*.—Temperature  $102^{\circ}$ , pulse 124; skin less mottled, tongue white, with red centre; one small hard stool. *Sunday*.—Temperature  $101^{\circ}$ , pulse 120; tongue cleaning; one hard stool. *Monday*.—Temperature  $101^{\circ}$ , pulse 120; tongue cleaning; one large formed stool; eruption fading. *Tuesday*.—Temperature  $99^{\circ}$ , pulse 100; very cross, not inclined to eat; but from this convalescence progressed steadily, and the child was quite well in about a week.

I had several very interesting cases of disease of the liver under my care, one of which I will here mention in detail.

J. K., a sailor, aged 45 years, arrived here in November 1878 from Newchwang. His history was one of hard drinking and dissipation for many years, a hard life at sea in various climates, and latterly hard usage, having had a fall from aloft on one occasion, and a severe blow, in the right side, from the wheel of a ship while steering, on another occasion; he attributed much of his discomfort and suffering to this injury from the wheel. When I first saw him he was hardly able to stand or speak, his legs being œdematous and considerably swollen. The œdema continued up to about half-way to the umbilicus from the symphysis pubis. I could not detect any fluid in the abdominal cavity at this time. His liver was much enlarged, but without tenderness. His heart was acting very feebly and irregularly, and the respiration sounds throughout the lungs were very weak and short, and mucous râles were detected in the lower lobes. He was admitted to hospital, and under a course of diuretic treatment, with occasional purging, he improved very much in every way till towards the end of January 1879. His urine was slightly albuminous at first, but contained no tube casts, and as he improved in health the albumen totally disappeared. Towards the end of January he began to complain of weight and numbness in the right side, and weakness in the right leg and arm, and the liver commenced to increase almost visibly in size from day to day, till the area of dulness extended to below the umbilicus and to the left false ribs above, the stomach being pushed round completely to the left side; the liver had a nodulated feel, but there was no tenderness. At this time he had constant diarrhœa, passed almost no urine, vomited frequently after food, and complained of great fulness after taking the smallest portion of food or drink, no doubt owing to the pressure exercised on the stomach by the enlarged liver. His feet and legs again began to swell, and the swelling gradually extended up as high as the umbilicus (the scrotum and penis were of enormous size), and his breathing became much laboured. He was, towards the middle of March, in a most miserable condition, unable to lie down, unable to walk, and almost unable to eat or drink. I punctured the penis and scrotum on several occasions, and allowed a large quantity of water to escape in this way, and gave him considerable relief. I was never able to detect fluctuation in the abdomen all this time, though I was convinced there was fluid in the abdominal cavity. I suppose the enormous mass of the liver half filling the abdomen must have masked the fluctuation which

ought to have been detected. The walls of the abdomen were very much distended, and he was suffering so much that his end seemed imminent. At the beginning of April he was quite delirious, for some days never resting day or night; the respiration very laboured, and hardly any respiratory sounds audible, the heart acting very rapidly and feebly; œdema general over the body, even to the finger ends. Dr. GAULD kindly saw him with me at this time, and we decided that there was no use in tapping the abdomen, as there was no fluctuation detectable, and great danger of wounding the liver in performing the ordinary operation of paracentesis abdominis. (The absence of fluctuation was very noteworthy, because the abdomen was enormously distended with *fluid*, and had the appearance as if it were about to burst.) A few days later on I decided to introduce a fine aspirator needle, as the poor man was suffering so much distress. I might possibly relieve him, and his end seemed so near, I could not do him any great injury. I accordingly introduced a fine aspirator needle in the middle line, as near the pubes as I could with safety, and drew off 90 ounces of pale ascitic fluid, when the needle got clogged and refused to work, and I desisted from further interference (though there was plenty of fluid remaining in the cavity of the abdomen, and fluctuation was now quite evident), as the man, though much relieved, was feeling faint. A couple of days later I introduced an ordinary trocar and canula, and succeeded in drawing off only a few ounces of fluid, after which the canula got filled with a long string of coagulated serum or mucus, and I had again to desist. I now left him for three weeks, until the belly was once more distended with fluid, and introduced at this time a large size aspirator needle, and this time drew off 160 ounces of fluid; this was in the beginning of May. I continued to tap him from time to time till August, when I tapped him for the last and eighth time, taking away a large quantity of fluid. After this he steadily improved, and began to pick up flesh and to regain his appetite and spirits; his liver continued very much enlarged; the lower edge could be felt near the umbilicus, but the abdomen never filled with fluid again. He felt so well that in October he asked to be discharged from hospital, and went to Hongkong.

A very interesting case of abscess came under my care, occurring in a Chinese girl of 11 years of age:—

She had been unwell for several weeks with what appeared to be fever of an intermittent character, and latterly complained of pain and stiffness in the right hip joint, but was able to move about, though with considerable difficulty. Gradually a swelling developed in the upper part of the thigh, and she was obliged to lie down. At this time she suffered from considerable pain and high fever at times. When I first saw her, some nine weeks from the commencement of her illness, the thigh was greatly swollen from the great trochanter to within an inch of the knee. She would hardly allow any examination, owing to the pain she experienced, and was and had been lying with the leg flexed on the thigh and the thigh flexed on the pelvis. Pulse 140, tongue foul, bowels relaxed, temperature 103°. I was obliged to put her under the influence of chloroform to make a thorough examination, and found that there was perfect motion in the hip joint and knee joint, and that there was as yet no fluctuation detectable. I straightened the limb and waited till the chloroform had passed off, and told the child, who was very much surprised to find her leg straightened, that she must keep it in that position. She was a very bright, intelligent child, and said she would do what she could, and begged me not to put on a splint—which I threatened to do if I found the leg again contracted—of which she had a great horror. The question naturally arose, was this a simple collection of matter among the muscles of the thigh, or a psoas abscess? As I found no tender vertebræ, and that the joints were not involved, I inclined to the view that it was a simple abscess, and determined to open it as soon as I could make sure that there was matter anywhere near. In a few days, I made an exploratory puncture with an aspirator needle, and drew out a few drops of pus, and then opened the abscess freely, and gave vent to about a pint of healthy matter, giving relief to all the urgent symptoms. This abscess healed up perfectly in about 10 days, and I thought my little patient had made a capital recovery. But suddenly she complained of severe pain in the other thigh, and had all the symptoms of an abscess beginning at that side, and so it proved to be; and how were we to account for this second abscess unless

by the presence of dead bone somewhere, either in the pelvis or spine? But the symptoms were those of an acute abscess forming; great pain and pyrexia, and general constitutional disturbance, and not of a psoas abscess; and so I determined to treat this also as I had done the former, and to open it as soon as possible; and, in about 10 days from its commencement, I made a free incision, and allowed the discharge of a large quantity of healthy pus. I put the child on bark and ammonia, and fed her well; but this abscess would not heal, and kept on discharging for nearly two months. I could find no bare bone anywhere. Though the cavity of abscess went very close to the hip joint, yet the joint moved freely and without pain. There was considerable thickening of the tissues around the trochanter, and this leg was an inch longer than the right one. I explored the cavity of the abscess thoroughly, and found where there was burrowing among the muscles of the thigh, and then had the leg carefully bandaged, and the thigh encased in pads of cotton wool, and tightly bandaged over all, and applied counter-irritants round the trochanter and the hip joint, leaving a place for the discharge. I then put the limb into a long splint, and kept it at perfect rest. The improvement was wonderful in a few days, the discharge ceasing almost at once, and all pain leaving also. The thickening about the trochanter continued for some weeks after the wound in the thigh closed up, as did the lengthening of the leg; but she made a good recovery, and there is now no sign of disease anywhere, and the leg has resumed its natural length.

I have been glad to notice lately an increasing desire among the Chinese, in the more immediate neighbourhood of Swatow, for foreign medical advice, and that for some time past the villagers living near me have on many occasions come to me for assistance in their smaller ailments, bringing their children to me for advice at the commencement of many infantile fevers and diarrhoeas and other complaints, instead of bringing their sick, as is usually the case, as a last resource, to the foreign doctor when they are too ill to be benefited by treatment. As a rule, the Chinese who seek foreign medical advice have first exhausted all native means of cure, and the foreign doctor is sought because he may possibly do good, and cannot possibly do any harm, things being so bad. Ulcers of 10 and 12 years standing, involving a whole foot or half a leg, they bring, and expect to be cured in a few days or weeks. Eyes which have been blinded by native interference are often brought to be healed. Tumours which have been made malignant or semi-malignant by the free use of the favourite moxa, come, and give infinite trouble in removal, when they might have been taken away easily and safely had they come before they were tampered with, and so with too many of their cases. Acute diseases among natives are rarely seen by foreigners, and I am glad to see the people here seeking foreign advice early in their ailments. I encourage the people around me to call on me as much as possible, and within the last two years they have come in considerable numbers. If they could be induced to seek for help early in cases of difficult labour, what an immense amount of suffering and loss of life might be hindered.

There have been four births during the six months—two girls and two boys: one a natural labour; one a premature labour; one a laborious labour, necessitating forceps extraction; and one a retained placenta. There have been four deaths: one a baby on board ship, aged nine months—convulsions; the second a sailor—typhoid; the third a resident child—typhoid; and the fourth a resident child, aged three years—cerebral disease, complicated with dysenteric diarrhoea.

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**K.—Dr. ALEXANDER JAMIESON'S Report on the Health of Shanghai for the  
Half-year ended 30th September 1879.**

DATE.	Barometer at 0° C.	THERMOMETER.		Elastic Force of Vapour.	Humidi- ty.	Ozone.	Velocity of Wind observed hourly.	Mean Direction of Wind.	Total Evapora- tion during Month.	Total Rainfall during Month.	REMARKS.
		Diurnal Mean Temperature in Shade.	Extreme Temperature in Shade.								
1879.	mm.	° C.	° C.	mm. of Mercury.	0-100.	0-21.	Kilom. per Hour.		mm.	mm.	
April ...	Max... 774.04 Mean 762.93 Min.... 748.50 Range 25.54	13.04	24.50 — 0.60 25.10	mm. 17.10 9.11 3.50 13.60	98.0 82.0 25.0 73.0	21.0 13.0 6.0 15.0	39.0 15.6 — —	N. 75° 6 E.	70.96	86.0	
May .....	Max... 763.60 Mean 757.30 Min.... 748.22 Range 15.38	19.32	29.10 — 13.10 16.00	20.40 13.63 6.80 13.60	99.0 82.0 38.0 61.0	21.0 11.5 6.0 15.0	47.7 13.5 — —	S. 66° E.	74.48	182.1	24th : storm from S. S. E.
June ...	Max... 763.65 Mean 756.05 Min.... 748.70 Range 14.95	23.19	33.00 — 13.30 19.70	26.40 17.90 11.00 15.40	99.0 84.8 50.0 49.0	21.0 9.8 5.0 16.0	32.0 11.6 — —	S. 57° 1 E.	58.59	235.4	Thunderstorms on 11th, 24th, and 30th. Cicadas heard for the first time on the 26th, when the heat of summer began.
July ....	Max... 759.52 Mean 753.98 Min.... 741.71 Range 17.81	29.26	36.80 — 23.70 13.10	28.50 23.32 20.20 8.30	100.0 78.0 49.0 51.0	10.0 5.6 0.0 10.0	42.0 15.6 — —	S. 27° 7 E.	120.45	22.9	Thunderstorms on 1st and 25th; typhoon on 31st; "one of the most violent that has ever visited these seas."
August	Max... 759.06 Mean 755.68 Min.... 747.50 Range 11.56	29.18	37.20 — 22.50 14.70	28.80 23.39 18.30 10.50	100.0 77.7 43.0 57.0	10.0 6.8 1.0 9.0	42.0 13.6 — —	S. 27° 4 E.	107.47	77.5	
Sept. ...	Max... 764.15 Mean 758.69 Min.... 751.85 Range 12.30	23.75	32.50 — 16.60 15.90	25.90 18.20 12.60 13.30	98.0 83.7 52.0 46.0	16.0 8.4 4.0 12.0	40.0 11.15 — —	N. 53° 6 E.	57.55	267.5	

The above abstract of observations has been compiled from the *Bulletin Mensuel de l'Observatoire Magnétique et Météorologique de Zi-ka-wei*. I append as usual three simple rules for reducing the figures to the scales in popular use:—

RULES.

To reduce millimètres to inches, divide by 25.

To reduce kilomètres to miles, multiply by 8 and divide by 5.

To reduce degrees C. to degrees F., multiply by 9, divide by 5, and add 32.

The hottest day of the season was the 15th August, when at 2 P.M. the thermometer registered 37°.2 C. (99° F.) in the shade at Sikawei. On the same day the same temperature was observed under like conditions in the settlement. From the 8th to the 18th August, both days inclusive, the mercury never fell below 80° F., and to correspond with this fact, there were between the 10th and the 15th ten cases of death from heat apoplexy. The following return of burials for the period under review is drawn from the sexton's books and the registers of the English, French, and Catholic cemeteries:—

BURIAL RETURN of FOREIGNERS for the Half-year ended 30th September 1879.

CAUSE OF DEATH.	APRIL.	MAY.	JUNE.	JULY.	AUGUST.	SEPTEMBER.	TOTAL.
Debility.....	...	...	...	I	...	...	I
Remittent fever.....	...	...	f I	...	...	...	I
Enteric fever.....	...	I*	...	...	...	I	2
Cholera.....	...	...	...	...	2	...	2
Cerebral effusion.....	...	I	...	...	...	...	I
Cerebral meningitis.....	...	...	I	...	...	...	I
Convulsions.....	...	...	...	I†	...	...	I
Apoplexy.....	...	...	I*	...	...	...	I
Alcoholism.....	...	...	...	I	...	I	2
Sunstroke.....	...	...	...	I I*	6 3* f I*	...	12
Phthisis.....	...	I I*	I	...	f I	...	4
Liver, congestion of.....	...	I	...	...	...	...	I
„ cirrhosis of.....	...	I	...	...	...	...	I
„ cancer of.....	...	...	...	...	...	I	I
Gastro-enteritis, acute.....	...	...	I‡	...	...	I	2
„ chronic.....	...	...	...	...	I‡	...	I
Intestinal catarrh.....	...	...	...	I*	...	...	I
Diarrhoea.....	...	I*	...	* I†	...	I I*	4
Cholera infantum.....	...	...	f I§	* I	...	...	2
Bright's disease.....	...	...	2*	...	...	I*	3
Albuminuria.....	...	...	...	...	f I	...	I
Premature birth.....	...	...	f I¶	...	...	...	I
Congenital deformity.....	...	f I¶	...	...	...	...	I
Accident.....	f I**	...	I	I 2*	...	...	5
Drowned.....	2*	...	I*	...	...	I	4
Suicide.....	...	...	...	I	...	...	I
Uncertified.....	I	...	...	I*	I††	...	3
TOTAL.....	4	8	11	13	16	8	60

\* Not resident. † 1 year. ‡ 5 months. § 7 months. || 6 months. ¶ 2 days. \*\* 2 years. †† 5 years.

Setting aside non-resident adults (20), and children under five years old (10), there remain 30 deaths among adult foreign residents during the summer half-year. Subtracting again two cases of accident, one of drowning and one of suicide, this number is reduced to 26 cases of death from disease. Of these, 23 were males and three were females, as against 20 males and two females during the same period of 1878. They may be thus arranged:—

Debility . . . . .	I	Sunstroke . . . . .	7
Remittent fever . . . . .	I (female).	Phthisis . . . . .	3 (1 female).
Enteric „ . . . . .	I	Hepatic affections. . . . .	3
Cholera . . . . .	2	Intestinal „ . . . . .	2
Cerebral affections. . . . .	2	Renal „ . . . . .	I (female).
Alcoholism . . . . .	2	Uncertified . . . . .	I



The deaths among children were due to the following causes:—

CAUSES of DEATH among CHILDREN, April to September 1879.

Congenital deformity . . . . .	1	female, aged 2 days.
Premature birth . . . . .	1	„ „ 2 „
Accident . . . . .	1	„ „ 2 years.
Convulsions . . . . .	1	male, „ 1 „
Gastro-enteritis . . . . .	2	males, „ 5 months.
Diarrhœa . . . . .	1	male, „ 1 year.
Cholera infantum . . . . .	1	„ and 1 female, aged 6 and 7 months.
Uncertified . . . . .	1	„ aged 5 years.

One case of diarrhœa and one case of cholera infantum occurred among children who had contracted their disease elsewhere.

Of the 20 non-resident adults who died during the six months, two owed their deaths to accident and three were drowned, and of the remaining 15 who died of disease, one was a female who died of sunstroke.

CAUSES of DEATH from DISEASE among MALE ADULT NON-RESIDENTS,  
April to September 1879.

Enteric fever . . . . .	1	Intestinal catarrh . . . . .	1
Apoplexy . . . . .	1	Diarrhœa . . . . .	2
Sunstroke . . . . .	4	Bright's disease . . . . .	3
Phthisis . . . . .	1	Uncertified . . . . .	1

Among residents, two fatal cases of cholera were reported in August. There was, however, nothing even remotely resembling an epidemic. In my own practice I had one case of severe serous vomiting and purging with cold extremities and collapse in a middle-aged adult. No urine was passed, and apparently none was secreted during the period of purging, but as soon as this was checked (by morphia hypodermically, ice internally, and heat to the surface), the secretion was re-established. Eight cases of the same character (one fatal within half an hour) were brought into the Gutzlaff Hospital. All recovered, with the exception of one moribund on admission, and in all but one there was a history of sleeping in the open air on the previous night and of indulgence in raw fruit and ices. The case of cancer of the liver occurred in my practice, and will probably form the subject of future full report. But one fatal case of diarrhœa among residents is reported. It is hardly too much to say that the cases of "cholera," alcoholism, and sunstroke, amounting together to 11, were strictly preventable. Abstraction made of these, the mortality return of Shanghai for the most trying months of a particularly trying year is far from being alarming.

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